ENVIRONMENTAL ASSESSMENT BOARD

ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 158

DATE: Monday, June 8, 1992

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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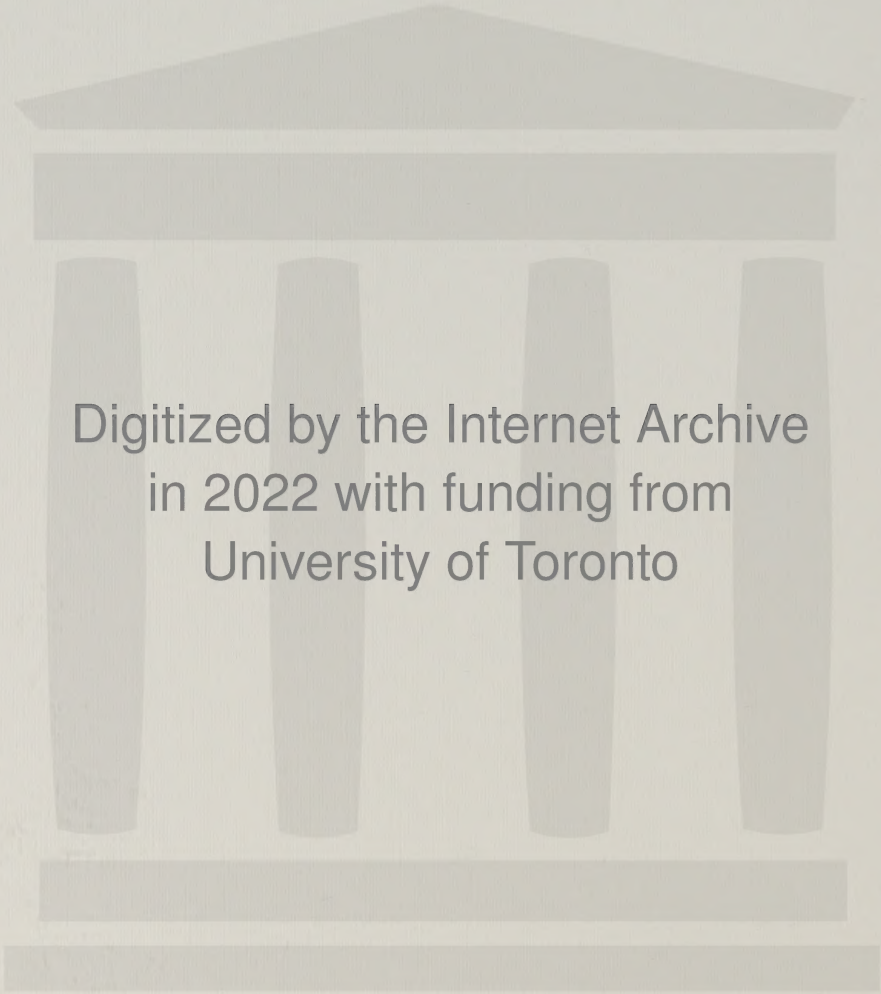

ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act, R.S.O. 1980, c. 140, as amended, and Regulations thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro consisting of a program in respect of activities associated with meeting future electricity requirements in Ontario.

Held on the 5th Floor, 2200 Yonge Street, Toronto, Ontario, Monday, the 8th day of June, 1992, commencing at 10:00 a.m.

VOLUME 158

B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
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MS. G. PATTERSON	Member

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THE REGISTRAR: Please come to order. This hearing is now in session. Be seated, please.

THE CHAIRMAN: Mr. Campbell?

MR. B. CAMPBELL: Thank you, Mr. Chairman.

I don't see Ms. Findlay here this morning, but I thought I should mention to the Board on a matter that came up last week. There was an interrogatory response that she referred to and there was some concern about cross-examination continuing, and in particular the material attached to the interrogatory response referred to an all-supply case. And you will recognize that I had to make some inquiries about that and I have done so and responded to some concerns raised by Ms. Findlay about it. I thought I should just advise the Board as to what in fact that was all about so that you have some perception of the context of the interrogatory answer.

I can advise the Board that no all-supply case was developed in the course of preparing the Update filed as Exhibit 452, nor was such a case presented to Hydro's board of directors. The development of the Update has been fully and correctly described in the evidence in the course of Panel 10.

The analysis that was included with Interrogatory 10.42.31 is work which was begun in early 1992 by the energy economics section of the economics and forecast division following preparation of the Update. What was it was intended to do, as I understand it, was to compare the economic and financial impacts of the Update cases; that is, the ones that have previously been described to you.

Now, at about the same time that that work was begun, the energy management branch asked for information that would permit analyses which had been previously done in relation to Plan 15 and provided to intervenors in Interrogatory 10.7.19, which was issued in October '91, and 4.32.9 which was issued in April '91, to be revised to reflect the Update.

That material that's attached to those two interrogatory answers has been used also in various other interrogatories and has also been filed with I think a couple of undertaking responses.

Dealing with both of those interrogatories, just to give you some sense of what that analysis was all about. Interrogatory 10.7.19 analyzed the economic borrowing and rate impacts of the demand management plan by comparing Plan 15 to a hypothetical case where you took out the demand

management and substituted additional supply for that demand management, and Interrogatory 4.32.9 used that same comparison to determine the environmental characteristics associated with such a substitution.

So the questions at that time in those interrogatory responses said what if you took out demand management what would be the effects, economic impact, rates and borrowing, and what would be the effects on the range of environmental calculations that have been done if supply was substituted for demand management.

Now, the energy economic section having started this review of the update cases and having been asked to update the analysis in those interrogatory responses for the energy management branch combined the review of the update cases and the impact of demand management and that resulted in the material included with Interrogatory 10.42.31, in effect, took these two requests for analyses, put them together in that document. And the material that is attached to that interrogatory is the section's draft report which was circulated for review and comment in mid-May.

THE CHAIRMAN: I hesitate to interrupt you, but aren't you giving an awful lot of evidence here that people may want to cross-examine on?

MR. B. CAMPBELL: Mr. Chairman, I am trying to outline how this thing came about.

I obviously can't review this in detail with the witnesses and I am not sure they are aware of all of these circumstances because they were not directly involved.

So I have written to Ms. Findlay, I was asked these questions and I felt I should describe to the Board there are some errors in that material and I thought I should bring it to the Board's attention and give the background.

THE CHAIRMAN: Both AECL and the MEA have asked to cross-examine on this particular matter, and before doing so have asked for additional information which I understand you are prepared to supply them with. So I am just wondering why we should be getting this at this particular point.

MR. B. CAMPBELL: I am not giving the results of this, Mr. Chairman. I am just trying to explain to the Board the origin of this material as I was asked to do by AECL in correspondence dated June 4th, which was copied to the Board and which I have responded to, also copied to the Board, and I have copies of this letter available for my friends should they wish to do it.

I just thought it was useful to put on the record given that the question came up, I felt I was under an obligation to explain the circumstances that had given rise to this. I am not giving any of the results and they have and will continue to be made available.

THE CHAIRMAN: I am just pointing out that this may be a consequence of what you are doing. That someone is going to want to maybe question some of the material you have given to us this morning.

MR. B. CAMPBELL: I have provided this to AECL and have been requested for such an outline for others. Anyway, it goes to their request. I imagine it's matters that they want to consider as to whether they re-examine, and I am aware of that risk. That's exactly why the questions were asked, as I understand it, and why we have tried to deal with the full response.

In any event, though, I think it is important because the interrogatory that's being referred to, it was circulated in draft, and when the Hydro people answering interrogatories became aware of that work, it was identified as being pertinent to certain AECL interrogatories, and at that point the review of the report should have been completed prior

to the report being issued, that didn't happen, and the draft report was inadvertently distributed with that interrogatory and it contains at least two factual errors.

The first, of course, is that the initial paragraph may create the impression that an all-supply case was developed in the course of the Update process, as I have explained that's not the case.

Second, the draft describes the economic borrowing and rate impacts of substituting supply in the case of demand management as being based on fossil generation, and, in fact, I am advised that the analysis is more closely related to the managed nuclear case with demand management being removed and supply facilities advanced.

Now, we have been asked by AECL to provide the exact capacities that are assumed. I expect that we will shortly be able to provide the load and resources tables which give the exact description of the capacity assumed for the analysis, as well as LMSTM results which provide associated energy quantities. We will of course provide a copy of the energy economics section report in its final form. We expect to be in a position in a few days to do that.

We also expect to be in a position within

three weeks to provide equivalent environmental information to that contained in Interrogatory 4.32.9, being the emissions and other environmental quantities associated with the substitution of supply facilities for the demand management component of the managed surplus nuclear case.

I want to emphasize that these analyses that I have described are all of the analytic work conducted in relation to an all-supply approach.

As I say, AECL wrote a letter to Ms. Morrison, copied a letter which was to me to Ms. Morrison, I have similarly done so with my response to Ms. Findlay with respect to this matter.

[10:13 a.m.]

But as I say, I thought it important, given the context in which it came up to advise the Board of that matter. Obviously, we would have preferred the interrogatory response to be correct. But correct material will be provided.

THE CHAIRMAN: Mr. Hunter?

MR. HUNTER: Good morning, Mr. Chairman, Ms. Patterson, Dr. Connell. With me is Anna Torma, T-o-r-m-a, of our firm, and Andrew Connor of Dofasco to assist me.

I might make just three very brief

introductory comments. The first is that Dofasco is an integrated steel mill and is one of the largest consumers of electrical power in the province. Needless to say they had immediate interest in the outcome of this hearing.

Secondly, our purpose here is really to obtain information from Hydro to try to come to an understanding of the proposed plan in order that we may better plan our own activities over the course of the coming years.

And thirdly, that we have attempted to the best of our ability to review the evidence entered by the previous or the cross-examination principally by MEA, AMPCO, AECL; and we will attempt our best not to tread into areas that they have already touched. I will try to take advantage of some of the work that they have done to focus on specific issues of specific concern to Dofasco and their operation and, obviously, their needs again over the coming years.

If I might, I presume Mr. Shalaby or Mr. Snelson, if I mispronounce your names, please, is it Shalaby?

MR. SHALABY: Shalaby is good.

MR. HUNTER: And I presume, Mr. Snelson, in reviewing the cross-examination, you dealt

principally with areas of fuel switching.

I apologize. We have prepared a document which I think should be entered as an exhibit.

THE CHAIRMAN: All right. The panel got --

MR. HUNTER: No, I'm going to give that to them right now.

THE REGISTRAR: Number 705, Mr. Chairman.

---EXHIBIT NO. 705: Package of materials to be used by Dofasco in cross-examination of Panel 10.

MR. HUNTER: There are extra copies. What we have attempted to, Mr. Chairman is limit our cross-examination to the documents which we have presented to the Board and to the panel.

THE CHAIRMAN: It would have been helpful, in fact it's been the practice, that documents of this kind should be given to the witnesses prior to the cross-examination so they have a chance to go through it and study it. It makes it a lot easier for them to answer the questions if they have had the material in advance.

MR. HUNTER: I appreciate that. We just completed this on Friday. I think the point I would make is there is no new material here. This is all material which has been taken from material provided by

Ontario Hydro or transcripts that have already been entered as exhibits.

THE CHAIRMAN: Yes, leafing through it that appears to be the case.

MR. HUNTER: So I don't believe that -- I will give the panel members a few moments and the Board, but I don't believe there is any new material in here.

THE CHAIRMAN: Let's just proceed and see how we do.

AMIR SHALABY,
JOHN KENNETH SNELSON,
JANE BERNICE TENNYSON,
FREDERICK GEORGE LONG,
BRIAN PAUL WILLIAM DALZIEL,
HELEN ANNE HOWES; Resumed.

CROSS-EXAMINATION BY MR. HUNTER:

Q. First, Mr. Snelson, if I could take you to what is Exhibit 542, which is our page 1. And I draw your attention to figure 6 at the bottom. And could you please identify for us the percentage of energy that would be identified, or the megawatts that would be identified in, firstly, the fuel switching area which is identified, and then secondly in the energy efficiency sector and then in the load shifting. I'm referring to the 1992 Update. And we are interested in --

THE CHAIRMAN: I think this document is not, although it is called Update 1992, it's not Exhibit 542; it's a brochure that Hydro put out called the Update which to this moment has not been filed as an exhibit. Was it filed?

THE REGISTRAR: 542.

THE CHAIRMAN: No. Perhaps someone in Hydro has a copy of it.

MR. HUNTER: I'm referring, Mr. Chairman, to the document that, the Update document, not 452.

THE CHAIRMAN: What exhibit number was it?

MR. HUNTER: Well, I'm misspeaking myself. I assumed it was Exhibit 452, but it's the brochure that was filed.

THE CHAIRMAN: Right.

MR. HUNTER: And it's in our document 1 on the front page.

THE CHAIRMAN: Has somebody got the number for that? 535?

MR. B. CAMPBELL: No, no. Mr. Chairman, I don't believe that has an exhibit number. I am not able to turn one up. I think the complete document on which we are relying is 452, and this was a version which was prepared for broad general public information

as opposed to another one.

If my friend has particular questions, I take from his question that he wants to know the amounts of certain measures. I think the graph relates to 2014. And I think my friends can probably answer that question, my friends on the panel can probably answer that question.

MR. HUNTER: As I understand the evidence, Mr. Chairman, Hydro is saying that in their forecast, their forecasting a saving, approximately 9,860 megawatts by the year 2014. And I am simply interested in knowing the breakout, the percentage of those savings by the particular program or method that they are going to use.

MR. SHALABY: Exhibit 452B has --

MR. HUNTER: Q. Would you bear with me one moment?

MR. SHALABY: A. Yes.

Q. Is it possible for you to relate that to the Update if I can't find --

A. Yes, it is. Exhibit 452B, and I am about to ask you to go the Update to figure 7-22.

Q. I'm afraid I don't have that document with me.

MR. B. CAMPBELL: I think we can provide

a copy.

MR. HUNTER: Q. And am I referring now to page 7, the bottom of page 7?

MR. SHALABY: A. Page 5. It's got a No. 5 on the bottom.

Q. Yes.

A. That figure is showing the components of demand management for every year from 1992 on to the end of the planning horizon. And you see at, when you go to the year 2014, if you go across several columns, when you come to the heading Total Megawatts, you find your 9,855. And the numbers preceding that are the components that make the 9855.

Q. So I'm looking at energy efficiency and that is 4,288, is that correct?

A. That is correct. The megawatts is 4,288.

[10:23 a.m.]

Q. And then I go over to load shifting and it is 1,280; is that correct?

A. That is correct.

Q. And then I go over to fuel switching--

A. Yes.

Q. --and that is 7,989; is that correct?

A. No, 3,490 is the megawatts.

Q. Oh thank, you, yes.

A. The number you read was the gigawatthours.

Q. And that provides me with -- I'm just trying to add it up. Fine, thank you.

In terms of the percentage, if I understand the evidence correctly, this is found at page 2 of our exhibit and I think Mr. Shalaby you gave this evidence, and this is identified at approximately lines 16 to 21 - and I don't intend to quibble with you on this - but I believe your evidence was that the energy efficiency improvement was the most significant component of demand management, and I presume you are basing that on a comparison of the 4,288 megawatts version 3,490?

A. I was speaking of the year 2000 in particular at that time. If you want to go to the year 2000 numbers that is what I had in mind.

Q. I suppose the difficulty I have is that when I looked at the graph, in particular, looking at Exhibit 682 on page 11, which is our No. 3--

A. Yes.

Q. --I had difficulty appreciating the analysis that you presented when I looked at the

savings projected beyond the year 2005, and it was my just visual observation that the savings were roughly the same.

A. The same between...?

Q. The same between energy efficiency savings and fuel switching savings.

A. They do become closer together towards the end of the planning period, but as my evidence on page 2 indicates, I was speaking about the year 2000. In the year 2000 the dominant component is efficiency. If you draw a vertical line around the year 2000 or look at the table 7-22 under the year 2000, you will find that efficiency is roughly twice or a little less than twice fuel switching in the year 2000. They become more comparable towards the end of the period.

Q. That was my question.

A. You are quite right.

Q. So you would agree with me they are more comparable as you proceed beyond the year 2005?

A. The fuel switching increases at a faster pace, yes.

Q. Okay.

A. Still the efficiency improvement is a larger component but it still is the most dominant

component, but maybe not as much as it was in the year 2000, so...

Q. And if I go again to our page 3 --

A. The other thing you may notice as well is that the energy associated with efficiency improvement in the year 2014 is 24,500 gigawatthours, the energy associated with fuel switching is 7,989. So the energy ratio is about three to one, efficiency saves three times as much energy as fuel switching even in the year 2014.

So, again, focussing on one dimension only perhaps may not give the full picture.

Q. And, I'm sorry, sir, I'm going to have to ask you explain that again. I didn't appreciate your answer.

A. The measurement by megawatts is the measurement at the time of peak, the reduction in the peak demand--

Q. Yes.

A. --is measured in megawatts. The saving of energy throughout the year is measured in gigawatthours. So what the numbers indicate that while the megawatts may be comparable between fuel switching and energy efficiency, the energy efficiency operates, or would have operated more often saving more energy

throughout the year. It's the load that has a higher load factor, for example.

For example, lighting is on in a commercial building for 5- or 6,000 hours a year whereas gas heating may be on for 2- or 3,000 hours a year. So if you switch gas heating you don't have it operating as long as lighting in a commercial building.

Q. But are we then saving electrical power as distinct from the total energy package?

A. We are saving both. Electricity has both attributes.

Q. But just to go back, there's no doubt that the savings expected between energy efficiency and fuel switching become comparable roughly from the years 2010 onwards, or perhaps even a little less than that.

A. In capacity they become comparable in energy. Energy efficiency still outstrips fuel switching by three to one.

Q. Just curiosity, at what point in time - again I'm looking at Exhibit 682 at page 11 which is our page 3 - at what point in time, in your view, does fuel switching become a substantial factor in demand management, because as I look at this diagram it's virtually nothing until 1995, '96, '97 and the band begins to broaden approximately the year 2000.

A. Yes, it starts to pick up in a major way in the mid-90s. Yes, 1994, 95.

Q. So your evidence is that fuel switching becomes a significant factor in '94, '95?

A. Yes. Well then, again, as seen in page 5 of Exhibit 452B that we looked at, you see the year-by-year contribution of fuel switching. What is shown there is 24 megawatts in 1992, 74 megawatts in '93, 169 in '94.

So, you know, it starts to become a three digit number in 1994 and that is a pretty significant contribution.

I'm sure my friends who are running the demand management function would think that 24 megawatts is pretty significant as well. So I think it's significant from day one but it starts to show on the graphs and take multiple digits in the mid-90s.

Q. I suppose the difficulty I have is understanding the use of the word significant; and, that is, that if in 1994 the amount is 169 measured as against 3,955 some several years later, what I'm really trying to grapple with is what is significant.

In other words, you have simply said your friends in demand management might say that 24 is significant. What I'm having a tough time

understanding is what is significant, given the range that you seek to expect over a substantial period of time. How do I evaluate what is significant?

A. I think I was giving the answer from the perspective of when does it become significant enough in, for example, deferring the need for major supply or reducing environmental impacts in a significant way from the operation of our coal-fired stations or reducing the need for imports from other provinces, you know, a significant amount of energy and capacity.

But as your own client might tell you, in the operation of their own mill a megawatt or two megawatts is a significant amount of power that operates an entire part of their operation.

Q. Well, perhaps we can take --

A. So significant to the customer, you know. In a commercial building 10 kilowatts could be half the load of a building, for example. So significant depends on the perspective and I was answering from the perspective on integrated plan.

Q. Perhaps you could help me there because I was having trouble with the generality of the word significant and you gave us I think four characteristics of how to evaluate that. Could you go

through that again?

A. You are the one who introduced the word significant, when does it become significant.

Q. Well --

A. That's how we got into this.

[10:30 a.m.]

Q. Well, I did. I was asking at what stage. That's fair. But I am asking you just simply to go through each of the analytical factors which you identified as contributing to our understanding of significance. I think you said, I am just asking you to go through them again. I know they are on the transcript.

A. Yes. I am just saying significant depends on the perspective. If you are a superintendent of an apartment building, then 10 kilowatt change in your demand is a significant amount.

If you are an operator in our system control centre, then 10 kilowatts will not show in your charts at all. And perhaps 100 megawatts becomes a quantity that you start paying attention to in terms of changing the operation of the system or dispatching another unit.

I am just saying, it depends where you are, what size customer you are, or what kind of

control centre you are, or you are looking 10 years ahead or looking today. It's a matter of perspective.

I have a great respect to a single kilowatt, and I invite anybody who doesn't know what a kilowatt is to go and cycle in the Ontario Science Centre, it's very, very hard to keep a 15 watt lamp lit. You would know how much work that is to keep a 15 watt lamp lit.

So if you don't know what a watt is or 15 watts are, just go and cycle, and you will run out of breath long before you have put out a kilowatthour, at least I do.

Q. I understand that we live in a world in which perception is reality. I have come to accept that phrase. But I am still struggling. Perhaps you tell me what your -- other than perhaps the example of the one kilowatt for a light bulb, in terms of the demand management plan in its total sense, at which point does fuel switching become significant? Let's take one example, in terms of I think you used the phrase deferring other electrical supply.

A. Yes.

Q. At which point in this plan does fuel switching meet that criteria, if you like, and therefore fuel switching becomes significant? Just

that criteria alone.

A. Well, I think we indicated that we have a surplus throughout 90s, so the contribution of fuel switching cannot directly be shown to defer the need for major supply on its own, but together with the other components of demand management, and together with the non-utility generation program, and together with the approvals that we are asking for here, all of that together makes the supply required in 2008, instead perhaps of the mid-90s or early 90s. We show in our evidence when supply would have been required if we didn't any of these programs and when supply would have been required if we had all of these programs. And you can strip them off one by one and decide when supply would be required without the presence of -- you take out whatever you like and see when supply would be advanced.

Q. Let me try one more time, sir. Can we go back to fuel switching and can you indicate to us when fuel switching alone will become significant with respect to deferring other electrical supply as distinct from factoring into it all of the other elements which you have just described?

A. Well, if fuel switching was the only option we were pursuing. If we were not pursuing

anything else, any efficiency or any NUGs or anything at all, then fuel switching would be the only mechanism we have to postpone the need for supply.

I am not sure whether I am satisfying your requests here or not.

I think of it as a package, the package delays the need by so much. And you are now asking me a question that is a bit hypothetical in the nature of "but how about a component in the package."

Q. I think I am entitled to ask you that.

A. I am just having difficulty separating the effect of a single component.

But, for example, if we look in the year 2000, let's take some posts in here to guide us and see whether that satisfies your question. In the year 2000 the reduction in demand due to fuel switching is about 1,275 megawatts. That is about three years of load growth at that time period. Primary demand grows by about 300 or 350 megawatts a year at that time, primary demand. Basic demand could be maybe 450 or so.

So somewhere between two and three years of demand can be met by fuel switching that will be in place in the year 2000.

Does that give you some sense of the

impacts of fuel switching? It can make --

Q. As an abstraction, yes; as a reality no.

A. It can make electricity, it can free up enough electricity that will be used to meet growth in demand for two to three years by the year 2000.

Q. If you assume that you don't meet that target, as a hypothetical, does that mean that the need for major supply will increase?

A. Yes.

Q. And over that same period of time?

A. It will advance from the year 2008 or 2009 that we need major supply, it will advance by two or three or four years depending on how much shortfall there will be in demand management. But if the entire component of fuel switching does not materialize, by the year 2008 that component is about 2,500 megawatts. I expect it to advance the need for facilities by maybe three to four years.

Q. Sir, if you could help us here. One of the issues which we are particularly concerned about, and I don't think that you should be surprised, or anyone would be, is --

A. If you have on this stand for a year and a bit like me, nothing surprises you very much.

[Laughter]

Q. I won't make any comments.

It should not come as a surprise that Dofasco would obviously be very concerned about not only the strength of the predictions, but the relationship between the targets that have been set and the possibility that those targets would not be met and what the consequences would be and what the time lines would be in terms of dealing with those issues.

Could you please help us by indicating why if you did not meet your targets by the year 2000, which is the example which you gave, that the major supply would then be required, if I understand you correctly, in approximately the year 2008. Those were the numbers that you gave us.

A. Yes.

Q. Why that time line? Why would it take eight years for that to show up in the system?

A. Perhaps I can refer you to Exhibit 452. Is that available to you?

Q. I thought it was. Yes, yes, I have it.

A. If we look at 452 there is an image in there that can perhaps help us describe that. Page 14, figure 7-1.

Q. Yes, sir.

A. If you focus on the middle two lines, there are four lines on that diagram, the middle line labelled median, that's the median primarily demand, and the line that is labelled available supply.

Q. Yes, sir.

A. If you look at those two you will see that throughout the 90s and the early 2000s there is a surplus, or available supply exceeds median demand. So, if fuel switching does not come about, what will happen here is that median demand line will go up. So if you can pencil in a line that is a little higher than median demand.

Q. Yes.

A. Go up with a line that is maybe half an inch or so above that, that is the situation without fuel switching. And you will see here that available supply continues to be adequate for a long period of time in the 90s and the early 2000s, but it starts to intersect with available supply, not in 2009 or 10 like shown in this diagram, but a little earlier. That is the effect that I was describing to you.

Q. So if I could reverse that, sir, if for the sake of discussion fuel switching is not effective, and we will get of get a little later on

into -- we are pushing back that date where you would require major supply; is that correct?

A. It advances. It doesn't become 2008, 9 or 10, it becomes 2004, 5, or 6. Something like that.

Q. Thank you.

Now, if I understand the evidence correctly, fuel switching was not part of the original proposed plan; is that correct, sir?

A. In 1989 it was not part of the plan.

Q. Now, with respect to the Update, it obviously is a part of the plan, and I would like to ask you, is there any implementation plan that has been -- I have reviewed the evidence and I don't see what I would understand to be an implementation plan, that is a document that says here is how we are going to implement fuel switching.

A. No, there isn't such a document, you are correct.

Q. If there is no such document, and this comes to the second major concern I have, how can you then identify the targets or numbers which you have identified on figure 7-22? In other words, how do you know that you are in fact going to achieve these numbers?

A. The basis for those numbers are in Exhibits 257 and 258. Those documents were presented throughout the testimony of Panel 4. They estimate the potential for fuel switching. So the plan that we have is based on our understanding of how many, for example, houses that heat electrically in areas that have natural gas, how much houses have water heating in areas that have natural gas. That is the type of assessment that we have gone through to estimate the potential for fuel switching.

When I was saying there is not an implementation plan, I understood that, and I interpret it to mean, we will launch the following program in the following segment in this year, we will place that much incentive, we will advise customers of switching from this model to this model, that is what we call a program or an implementation plan. But our estimates so far are based on our understanding of how many of these applications are out there that we think we can influence by marketing activities over the next several years.

Q. I'm not going to cross-examine on this document. I appreciate that this was entered in Panel 4. The only reason I can say we didn't deal with it is we didn't know at that time that it was -- at

that time it was not a part of the plan and it didn't seem to be of any substantial benefit to get into that document at this time.

MR. B. CAMPBELL: Just a minute, Mr. Chairman.

With respect, before leading the evidence on Panel 4 we made it quite clear that the estimates for demand management were being revised and they were being revised to include fuel switching. That was absolutely clear going into Panel 4.

MR. HUNTER: That may be correct, sir, but we were of the understanding that that was not a part of the plan.

[10:55 a.m.]

THE CHAIRMAN: Well, that would be a wrong understanding. I think Hydro made it very clear in Panel 4 that fuel switching was part of their plan. Of course, as you know they have to get legislative approval for it and they can't implement it until they have received that approval and whatever terms and conditions the legislature may want to impose on that.

MR. HUNTER: Q. Mr. Shalaby, in terms of the targets, then, if I can reduce it to -- is it fair to say, then, that the, that the targets, if you like, which have been established in figure 7-22 for fuel

switching is based upon Exhibit 257, which identifies, if it's fair to say, potential clients; is that correct? Is there any other documentation?

MR. SHALABY: A. Leaving aside the Exhibit 722, I don't know what that is, is that your exhibit?

Q. Sorry. Figure 7-22 in Exhibit 452B, figure 7-22.

A. Yes. If you were mentioning a figure number, the answer is yes. It's based on that Exhibit 256, 257.

Q. Just so I understand, there is no implementation plan to identify how these potential clients will move from electrical power to fuel switching or how potential gas clients will be brought on line.

A. No detailed plans. We gave evidence during the course of this panel that A, we are waiting the outcome of the legislative changes, and once that is in hand, we will see what the actual programs would look like. There is a scope in there of working with the gas companies, for example.

So it is a program that would be, perhaps, different in nature than the efficiency programs that we run in that we may be working with the

gas companies on this regard.

Q. And, sir, what assurances can you give this Board or, indeed, can you give us that, in fact, these targets are going to be met?

A. Well, the attractions give us some assurance, and that is, it is attractive to the customer. A home owner that heats water with electricity would find it in his or her best interest to switch to natural gas. Their bills would be lower, their costs would be lower.

The electricity company is interested in switching away from electricity and into gas. The gas company is interested into taking the load on and provide the gas. So I think we have formula where all three parties have interests. The owner of the house, the supplier of electricity, and the supplier of gas.

And then you have the provincial government giving us direction and blessing that move from a policy perspective. This combination of factors gives us comfort that this is a winner. I think it is going to work out.

Q. I don't wish to appear to be mean spirited, but it seems that what you are asking us to accept and plan to these numbers based upon a good idea and a lot of goodwill; is that fair to say that that's

what it comes down to?

A. Goods ideas and goodwill make a lot of things happen. It is based, you know, together with good technical feasibility beside it. We know where the gas lines run, we know what the cost estimates of conversion are. It isn't just a good idea and goodwill; it is based on some analysis that was presented to this Board, as well. And that is sufficient at this stage to base our plans on.

Q. Thank you.

A. Now, as with all demand management programs, we will monitor the early stages of the programs and see the extent of success that we have and modify either upwards or downwards the expectations that we have for the years to come. So we have got to get into it for a while and understand what the market is like and modify our expectations as we go through.

Q. What practical experience has Ontario Hydro had with fuel switching?

A. Not very much at this stage, other than people converting on their own. And Mr. Snelson mentioned earlier that in his own house he had the experience of switching to water heating by natural gas away from electricity. So as a program, as a utility, we haven't had much experience on a massive scale to

convert a large number of people. But on a personal basis we know that it is doable and it is being done.

Q. I dare ask if Mr. Snelson is the only one in the province who has done it; but I won't do that.

Has Hydro sent, am I correct in understanding that there are fuel switching programs in other jurisdictions in North America? Am I correct in that?

A. I think you are correct, yes.

Q. And has Ontario Hydro sent personnel to review or study those programs or work with them?

A. I don't know to what extent we have been in touch with people who have implemented programs like that.

Q. Do you know if Hydro has sent people to those jurisdictions to work with those programs?

A. I don't have specific knowledge, but it wouldn't surprise me. People meet in conferences and meet in demand management seminars. Whether we have had a mission to specifically look into programs for fuel switching going out to jurisdictions that have implemented that, I have no specific knowledge of that.

Q. Do you personally have any knowledge of other jurisdictions with fuel switching programs?

A. I think before British Columbia is a jurisdiction that proposed fuel switching. I'm not exactly sure what stage they are at this time. Many U.S. utilities are combination gas and electric. For example, many utilities in California are gas and electricity together. And for that reason, the switching to gas from electricity, the switching is a little more convenient to the utility if they handle both sides of the business.

Q. Are you aware, sir, of the targets, any of the targets that have been set in those jurisdictions and the ability of those jurisdictions to reach those targets, for example, over the last 10 years?

A. Not in those specific amounts. But I have known, for example, that there are countries that switch, oh, say from electricity to gas. I think Holland is one of those. When the North Sea gas was discovered, they urged cooking and heating and water heating to be switched on to gas and away from electricity. So it was a national program.

Q. Sir, in the preparation of Exhibit 257, did Hydro rely upon any reports that would be of value or interest to us? What I am really getting at in very simple terms is what is both the theoretical

and practical basis on which Hydro prepared and presented its evidence and has prepared and presented these numbers?

MR. B. CAMPBELL: Well, with respect, Mr. Chairman, there was an enormous amount of time spent on this in Panel 4. All of those numbers were gone through. The analysis was looked you at. The overlap with efficiency improvements in other areas was looked at. I think my friend, if he goes through the record in a systematic way will find an enormous amount of information just on that very topic.

MR. HUNTER: I think, Mr. Campbell, that I have gone through the record. And all I'm really trying to focus on here is what reports were relied upon, it is as simple as that, both with respect to the Panel 4 evidence and with respect to the Update.

Q. And if I have to, I will confine my questions strictly to the Update. But all I'm interested in is what information was provided or used to generate the Update and the numbers with respect to savings. If this is all there is, that's fine. I just want to know.

MR. SHALABY: A. The Panel 4 witnesses indicated that the data they relied on would have to do with identifying areas that are served with natural

gas, for example. And they looked at the provincial grid for natural gas distribution, and they looked at the density of population around areas that have natural gas service at this time. And they estimated that roughly 50 per cent of people who heat with electricity have access to natural gas.

We relied on our own data banks, the end use models and on other statistical data that we have in the preparation of demand management plans and load forecasts to estimate how many customers do heat with electricity or do either space heating or water heating with electricity.

We also looked at data about housing stock. How many houses are one story or two story, how many houses have ducts or do not have ducts. And some of this data was harder than others. Some data was more concrete than others. So they made assumptions about the number of stories and the number of houses that have ducts, that do not have ducts and use that data together with how many people have access to natural gas to come up with an estimate of the potential clientele for fuel switching.

Then there were assumptions about how many customers will switch every year, what we call the penetration rates for the programs. And when you sum

that up across the years, you come up with the estimates that you see in the Update. That is the nature of the data that was used for preparing these estimates.

Q. And you are referring here, sir, to the data at Update figure 7-2?

A. That is sort of the end result of those estimates.

Q. Now, correct me if I'm wrong, sir. But it's my understanding that in order for you to reach the targets that you have set for demand management that you identified, in the original DSP you identified 3,120 megawatts in what I call the original DSP, and that you have identified 3,490 by the year 2014; is that correct? Is that the number? I asked you to give me the range and I referred to 2014, 3,490 megawatts by the year 2014?

A. Yes.

Q. And if I go down to the year 2017, you have 3,955.

A. That is correct.

Q. And one of the concepts I'm trying to deal with here is, do those numbers represent reaching effectively 100 per cent of the target, or is there any number beyond that? In other words, you are targeting

for these numbers' megawatts. And if you don't reach that, those numbers, have you failed to reach 100 per cent of what it is you are targeting for? Is there any room for error in here, put it this way?

A. Yes.

Q. Okay.

A. Any target is simply an estimate of what we can achieve with program efforts that we would put in place. We could overachieve and we can underachieve. So there is room for going above that and there is room for going below that.

Q. But if you have set these numbers -- let me put it to you this way, then. What is your margin of error associated with these targets? Have you identified, given these numbers, a percentage plus or minus which it would be reasonable to assume should be allowed for in a planning process? I'm going on the assumption that no one is perfect and, therefore, no one is going to reach the actual numbers set. Or, in fact, are you presuming that those numbers are going to be met?

A. We are allowing for those numbers to be either higher or lower than what we will actually get. We have shown a number of places, a number of times, the flexibility that is necessary to respond to

either overachievement or underachievement of those targets.

[11:03 a.m.]

Q. Thank you. I think that is it for the moment, sir. I think we will be talking a little later on.

Ms. Howes, if you would please -- I believe you were dealing with the environmental considerations?

MS. HOWES: A. Yes.

Q. And if you could go to our pages 4 and 5 which deal with CO(2) emissions and NOx emissions.

And my questions are as follows: Firstly, if we go to the CO(2) emissions, and I would like to know whether or not those emission levels have taken into account or have incorporated fuel switching?

A. They have not.

Q. They have not. Why not? Why were fuel switching emissions not taken into account in this --

A. These particular figures show the emissions from Hydro's system and the fuel switching would be relying on other people to burn gas, for example, in their own homes to replace electric water

heaters or electric heating themselves.

Q. You said only Hydro emissions; is that correct?

A. Yes, that's correct.

Q. So it does not include then industrial emissions?

A. You mean such as from Dofasco?

Q. That's correct.

A. No.

Q. And does that same response apply to the nitrous oxide emissions, NOx emissions, on our figure 5?

A. Yes.

Q. Have you done any modelling as to the possible emissions that would result from fuel switching other than, obviously, from Hydro?

A. I haven't done any modelling but while you were questioning Mr. Shalaby I did some quick calculations.

Q. Yes. Would you care to share them with us?

A. Which calculations would you like?

Q. Well, I would like to know your speculation on, for example, CO(2) emissions as a result of the fuel switching targets that have been

set.

If we assume for the sake of discussion that you were 100 per cent successful in your fuel switching targets for residents and industry, what the CO(2) emissions would be in relationship to -- sorry --

MR. SHALABY: A. I want to bring to your attention that we had discussions in Panel 4 and, to my recollection, there are interrogatories that indicate that fuel switching results in a net reduction of CO(2). And the reason for that is, if we supplied an electrical heating load from our own system much of that will come from coal-fired stations and they will emit more CO(2) than if you send natural gas to the house and have it burned at the house.

So I just wanted to put in perspective the CO(2) issue. We have discussed that in Panel 4 and we have interrogatories that quantify exactly that effect, fuel switching reduces CO(2), it does not increase it.

Q. If it's coal-fired?

A. We know that much of the heating load will come from coal-fired stations. On the margin during the winter when heating is at its maximum additional demand is typically met from coal-fired stations.

Q. Thank you. If you would go to pages 6 and 7 of our exhibit, and I am not sure whether this is -- I will begin with Mr. Shalaby I presume and then if that's not appropriate, I'm not sure if Mr. Snelson would help us here.

What we are interested in here is the relationship between figure 3-1 and figure 3-2 with respect to mandation risk. And if I draw your attention to page 9 and figure 3.2, there is an area at the bottom identified between the line called Median and the line called Mandation Risk, if I understand it correctly, and I would like to know what that area is composed of; firstly, how much of it, if any, is fuel switching, and how much of that area, if any, is electrical efficiency improvements? Mr. Shalaby, are we together on that?

A. Yes, yes.

Q. Try to understand - just so we are clear - how much of that area as mandated risk would fall into either of those areas, if any?

A. I will have to refer to some of the data given by Panel 4 and I think you have it in page 19, I think.

Q. I'm sorry, sir, could you repeat that?

A. Page 19 of your own exhibits. Page 19 of your own exhibit shows Case C in demand management and that is the closest we have to the plan that is part of the Update, and if you look at the headings in that table under Ontario Energy Efficiency, see the middle block in that table is headed Ontario Energy Efficiency.

Q. Yes, sir.

A. On the left-hand side of that there's a heading called Fuel Switching and under that there's a heading Mandated. So that would show you the extent of mandation in the fuel switching department. That is one component of mandation.

So, for example, in old sectors the mandation in fuel switching is 750 megawatts by the year 2014 I think it was -- the year 2000. I'm sorry, the year 2000. This table is 2000. So that is one component of mandation.

The other one is two columns to the right under the heading Standards and that is under Electrical Efficiency Improvement. That is also something that is a mandation from the government, the extent of standards and that is 60 megawatts.

My understanding of that shaded area and the figure you referred us to is a combination of fuel

switching mandation and electrical efficiency improvement standards.

Q. So if I understand you correctly then, in the year 2000, to use your numbers, there would be 1,440 megawatts of what I would call mandated within that area of mandation risk; is that correct, just so we understand?

A. Yes, you add those two numbers, correct. You are correct.

Q. Now, when we look at the year - if you could help me, sir - 2014, I understand that we are looking at a mandated -- sorry, go ahead.

A. We are cross checking that. There's figure 3-2 in Exhibit 452A.

Q. Would you just bear with us, please?

A. Yes. It has a different result, that is why I'm a bit puzzled there.

Q. 452A, is that correct, sir?

A. Yes, figure 3-2. I'm trying to reconcile these two and I think I have an explanation, and if it's not correct I will get back to you on that. Do you have the table?

Q. I have 2.3.

MR. B. CAMPBELL: 3...

MR. HUNTER: 452A.

MR. B. CAMPBELL: Figure 3-2 on page 6.

MR. SHALABY: It's headed The Primary Load Forecast.

MR. HUNTER: Yes, I have it. Thank you.

MR. SHALABY: All right.

In that table - and that came up earlier in cross-examination - we are listing the mandation risk year by year and in the year 2000 the mandation risk is .9 gigawatts which is 900 megawatts.

That mandation risk listed here in that table is smaller than the sum of the two numbers we were talking about, and I'm guessing now that perhaps some of the standards listed in the earlier figure are already in place and perhaps are not a mandation risk at this time.

Perhaps it is only the standards that have not been implemented that are being talked about as potentially a mandation risk. The explanation of the difference in my view now is that 690 megawatts is standards.

MR. HUNTER: Q. Which you find in Appendix C3?

MR. SHALABY: A. Yes.

Q. Is that an incorrect number?

A. No, it is a correct number but not

all of it is at risk. I'm suggesting that some standards have already been implemented and been passed into regulations.

Q. But we don't know?

A. No, I know that there are standards that have been passed into regulations already.

Q. But you don't --

A. What I don't know is whether that fully explains the difference between the sum of these two numbers and the .9.

I'm offering that as an explanation of why standards plus mandation risk is higher than the 900 megawatts that you see here.

Q. Well, perhaps rather than take the Board's time at this time, could you undertake to secure an answer for us on that, please?

A. Yes.

MR. B. CAMPBELL: Well, if Mr. Shalaby determines that the explanation that he gave is incorrect, we will ensure that my friend is advised of the correct answer.

But I would rather leave it that it's correct until he needs to correct it.

MR. HUNTER: My only concern is which one is correct.

Q. You are presuming the 690 is correct?

THE CHAIRMAN: No, no. He's saying that 690 has two components in it; one, existing standards and two, probable future standards and that only the probable future standards are subject to mandation risk. Is that correct, Mr. Shalaby?

MR. SHALABY: yes.

MR. HUNTER: Okay.

DR. CONNELL: We probably should have on record the source of the page 17 -- those five pages, what exhibit are they from?

[11:15 a.m.]

MR. SHALABY: They are probably from Exhibit 256 or 257. They were also presented in the overheads used by Panel 4.

MR. SNELSON: At the expense of perhaps correcting my fellow witness, I suspect he is referring to Exhibits 257 and 258, but I don't think it related to 256.

MR. SHALABY: I slipped a notch here. Thank you, Mr. Snelson.

MR. B. CAMPBELL: Dr. Connell, I think specifically these are drawn from the appendices from Exhibit 258 which puts together fuel switching potential and energy efficiency standards, and deals

with the issue of overlap. So I think they will be specifically in 258.

MR. HUNTER: Q. Now, sir, if we go to the year 2014, I understand Hydro has identified a mandation risk of approximately 2,600 megawatts. This is found on our page 7, figure 3.2 at the very bottom. I just wanted to confirm that with you.

MR. SHALABY: A. Yes, I read it there.

Q. Sir, correct me if I am wrong, but do you know what percentage of that number would be fuel switching versus electrical efficiency at that time?

A. No, I don't have the answer to that.

Q. When I compared figure 3.2 to figure 3.1, why I became intrigued with this was it seems to me, and again it's again perception, that the mandation risk line followed the fuel safety line -- fuel switching line, not fuel safety -- fuel switching line, and I was intrigued as to whether or not the mandation risk, particularly after the year 2000, a substantial portion that was formed by fuel switching. I would just ask you for your observation on that.

A. Yes. I think the two slivers look similar, but I think that is more coincidence than anything else. I don't know the component of fuel switching mandation risk post the year 2000, I don't

specifically know that.

Perhaps the Exhibit 258 appendix, my recollection is that it has a snapshot similar to the snapshot presented for the year 2000 in your page 19. My recollection is that we have a snapshot for the year 2014. So there may be a table like that for the year 2014 presented in Exhibit 258. It's a good place to started looking at it.

Q. Would you agree with me that in the event that the mandation risk, or if you like, government policy, is not effective, that the median line would increase or rise?

A. There is that potential. We indicated that if we don't get mandation there is still a possibility of getting some of that potential through programs but perhaps not as much through programs. We know that standards are more effective in getting demand management than programs are.

Q. Could you help me, sir, with what it is you mean by programs?

A. Programs are incentives you offer to customers to choose gas heating, for example, rather than electric heat.

Q. And this will require, as I understand it, substantial funding; is that correct, or

funding?

A. It may or it may not. It typically requires expenditures from Ontario Hydro in terms of information, in terms of product development, customer service and incentives.

As I said, the programs for fuel switching are not fully formulated so we do not know the extent of incentives that may be required.

Q. Thank you. With respect to again figure 3.2, correct me if I am wrong, but why would I have anticipated that there would be a mandation risk that would sit atop the upper line? If you go to figure 3.2, you have the median and you have the upper?

A. Yes.

Q. Would there not be any mandation associated with that?

A. Yes.

Q. And would that sit above that line?

A. Yes.

Q. And would it sit there in the same proportion or to the same degree as it would sit above the median line?

A. Approximately, yes.

Q. In the event - and again it's hard for me to try to quantify this - but in the event that

your mandated area, sufficient government programs, sufficient government support is not forthcoming, you have identified - and I will put two concepts together - you have identified that you may need a major supply in the year 2000, if I understand it correctly, planning for the median?

A. Earlier than that. It would shift a little earlier than that. In the event that mandation does not come through or fuel switching does not come through.

I think we spoke about it in the context of the entire fuel switching program earlier.

Q. Yes, I am trying to deal with it strictly in this area.

Can you quantify for us, give us some assistance with the following proposition. Assume for the sake of discussion that government support, management, financing, was not forthcoming to, let's assume, 50 per cent. What I am struggling here is you have projected a mandation risk on the basis of "government support".

What I am trying to understand is that in the event that that support was not forthcoming for approximately 30 per cent; in other words, the targets set by the government or the support through their

programs was to fall by 30 per cent, at what point in time would you then expect that major supply would be required, assuming you have planned for the median?

A. To do that I will look at figure 3-2 of Exhibit 452A. Around the year 2007/2008 there is about 1,600 megawatts of mandation risk. So if you say there is a third of that that is not forthcoming, then a third of 1,600 is about 500 megawatts, a little more than that, that could be load growth for about one to two years. So it could advance the need date for supply by between one and two years.

Q. Again, that's bringing it back in time, 2006/2005 is distinct from 2008/2009 -- Sorry. If I focus on 2008, you would need the major supply in 2006?

A. Six or 2007, yes. All that is sort of ballpark estimates that we are giving you on the fly here.

Q. And assume, if you would, 50 per cent, so you are down to 800 megawatts, is that correct, following the formula you have applied?

A. Yes.

Q. And at what point, sir, would major supply then be required?

A. Again, I am estimating how many years

of load growth 800 megawatts will be and that would that would be about two years load growth at that time, so you would advance it by about two years.

Q. Thank you. Now, sir, if you would turn to --

THE CHAIRMAN: Perhaps if you are going to another subject, we can take the morning break, 15 minutes.

MR. HUNTER: Thank you.

THE REGISTRAR: Please come to order. This hearing will take a 15-minutes recess.

---Recess at 11:30 a.m.

---On resuming at 11:52 a.m.

THE REGISTRAR: Come to order. This hearing is again in session. Please be seated.

THE CHAIRMAN: Mr. Hunter?

MR. HUNTER: Mr. Chairman.

Q. Mr. Shalaby, if you would, and Mr. Chairman, I am now going to go to our page 8, 9, 10. I am not going to be referring to all of those pages, sir. This is the cross-examination of Mr. Shalaby by Mr. Rodger, and I don't intend to go through that in any great detail.

But, sir, if you would, I would like to seek your confirmation. What I have attempted to do is

take the transcripts and go through your cross-examination and reduce the cross-examination of you and Mr. Snelson to essentially four propositions. I would ask you to identify whether you would agree to my observations with respect to those, I will refer you to the pages, if you don't agree with my, if you like, convincing precis of the cross-examination, please say so obviously.

The first is, it was my observation, and this is found principally at pages 26814 of the cross-examination, that our review of your cross-examination is that it was within the capabilities of the computer models that you were using to accept probabilities for demand management; is that correct?

MR. SNELSON: A. No, I don't believe so. I think it is within the capabilities of the mathematical analysis framework to do so. I don't believe the computer programs have any provision in them for accepting uncertainty data with respect to demand management.

Q. So if I could put those in my layman's terms. You have a theoretical basis to do this based upon mathematical modelling, but at this time there is no practical way of demonstrating that; is that correct, or applying that through computer

analysis?

A. The computer programs that we use do not have that facility and that provision.

Q. Pages 26815, 26812, and 26813, my second observation is that Hydro felt that they could only use broad judgmental decision-making as opposed to probabilistic analysis with respect to the attainability of demand management.

Would you accept that as a fair observation of the evidence which was given in cross-examination?

MR. SHALABY: A. What page specifically are you looking at?

Q. 26815, 26812, and 26813. What I have done is I have tried to go through your evidence and Mr. Snelson's, and basically tried to synthesize that evidence in a fair way.

For example, Mr. Snelson, at 26814, So the way I see it is that 452 is saying we can't estimate or we don't have good ways of estimating the probabilities of achieving different levels of demand management.

And that subsequently there was statements made by the witnesses with respect to the need for substantial more understanding, and that the

nature of the challenge, for example, at page 26817:

"We indicated our targets are ambitious and are going to be challenging, yes."

And then there were additional comments made with respect to judgment. For example, 26812:

"At present, such uncertainties can be estimated only on a broad judgmental basis."

I am not trying to be... I just really want to try to understand and synthesize what your views are with respect to that evidence. Should I repeat the second part?

A. Would you, please?

Q. Yes. The second point was that Hydro felt they could only use broad judgmental decision-making as opposed to probabilistic analysis with respect to the attainability of demand management.

Would you agree that that was a fair synthesis of the evidence presented by yourself and Mr. Snelson, perhaps Mr. Snelson can respond, with respect to the evidence on cross-examination?

A. I would replace your word "attainability" with the word "uncertainty" around demand management. I think we showed a lot of analysis

that would give us the median estimates of demand management.

What we are saying we need judgment is how far above the median or below the median is possible, and at what risk, 10 per cent chance that it is 15 megawatts this way or 20 per cent chance that it is so many megawatts the other way.

So it is the uncertainty around the estimate that we use judgment for.

Q. The uncertainty with respect to demand management?

A. That is right.

Q. Thank you.

Thirdly, and this I think is principally at 26815 and 26814, that the reason why Hydro could not estimate probabilities was because they did not understand the behaviour of the factors or components of demand management.

Is that a fair review of your evidence on that point? I think what I indicated is we need some years of field experience before we have meaningful understanding of the behaviour of variables.

Q. And would you speculate with me as to how many years you are going to require?

A. Some programs we already have a good

understanding of the behaviour of the market; for example, streetlighting, we have done a significant portion of the streetlighting in various municipalities, we have a good understanding of that particular area of efficiency improvement.

Other areas we have very little experience in.

[12:00 p.m.]

Q. For example, sir?

A. For example, fuel switching.

Q. And how many years do you think will be required to estimate the effectiveness of that program?

A. I can't speculate. I just don't know.

Q. Thank you.

A. And I am reminded again that Exhibit 467 has, starting on page 20, a discussion of the uncertainty surrounding the demand management estimates. So I'm just referring you to that for completeness. We brought that up during the course of discussion on this subject.

Q. Thank you. Is it fair to say that at this stage that we will be relying upon your judgment -- sorry.

A. Go ahead.

Q. As I understand it, fuel switching is not available to industry, is that correct, or it has not been projected in your data as being available to industry.

A. The potential in industrial applications is felt to be small.

Q. Why is that, sir?

A. Again, the exhibit on fuel switching indicated that industry has taken advantage to a considerable extent, of the fuel switching opportunities.

Q. So, then, are we faced with the possible scenario where industry will be efficient on one hand; on the other hand, they cannot reduce their energy requirements but will, in fact, face higher rates?

A. I think Mr. Rodger took us through an example of an industry that has done efficiency improvements and load shifting and fuel switching. And we indicated that in that situation they would be faced with higher rates, yes.

Q. Thank you. And just one last question with respect to that. Have any studies been conducted to evaluate the impacts of higher rates on

profit margins of industry, in particular, electrically efficient industries?

A. I don't expect that Hydro has enough familiarity with profit margins of various industries. I think that requires an awful lot of knowledge about the particular industry and their own structures and their own production costs.

I think there are people in Hydro that know the industries in general, but I don't expect to the level of knowing what the profit margin sensitivity to electricity rates would be.

Q. Thank you. And one last, sorry, one last -- just if you could go to --

A. I think my expectation is that there are many industries who would consider that kind of information confidential. They would not make it widely available the relationship between production factors and profit margin.

Q. Mr. Shalaby, I wanted to just touch upon some comments you had made. This is found at our page 15. And top of our page 16, which was evidence in Volume 152 at pages 26827 and 26828, again with Mr. Rodger. And if I can take you, draw your attention to the bottom, your answer was, he was questioning you with respect to rates, higher rates and industry.

And at the bottom of the page you say,

> If they have achieved the maximum discount demand usage in load shifting and efficiency, they have got to be a world class industry, I think, and they should absorb a little bit of rate hikes at that time, yes.

And I guess I was firstly curious as to where you identify your defining world class industry on the basis of their electrical efficiency. I'm trying to understand that statement.

A. It is just an image in my mind that if an industry has taken advantage of all efficiency opportunities to the maximum, I envisage that they have taken advantage of many other competitive opportunities in their business, and I formulate an image of an industry that knows how to improve their production, how to become very competitive. And that label of world class may be overused, but that's the image that came to mind.

Q. So it is a question of perception.

A. Yes.

Q. Assuming that you had a world class industry that in your terms was energy efficient but was not particularly profitable, would your sentiment

about the fact that they can absorb a little bit of a rate hike, would that still apply?

A. If they are not profitable, then increases in electricity costs through them would make them even less profitable.

Q. I was curious as to what you meant by they should absorb a little bit of a rate hike. Would you speculate with me what that meant?

A. That meant that an industry that I perceived to be achieving competitive advantage as indicated by high energy efficiency would have margin to absorb a small increase in one of the production factors without detrimentally affecting the health of the industry. Again, that was the image that came to my mind.

Q. So that sentiment or perception, you are not just simply applying that to -- you have answered the question, thank you.

A. It is based on familiarity with various industries, various enterprises all around us, yes.

MR. HUNTER: I have a few questions, Mr. Chairman, on life extension. Again, I appreciate that a lot of this was dealt with in Panel 8. But I have specific issues I would like to visit hopefully

briefly. I don't know who will be answering those questions.

THE CHAIRMAN: There is nobody on this panel who is specifically able to discuss it in detail other than in the planning context.

MR. HUNTER: That is the context.

THE CHAIRMAN: All right.

MR. HUNTER: Q. Mr. Snelson?

MR. SNELSON: A. It would either be myself or Mr. Shalaby. Possibly even Mr. Dalziel; it depends on the nature of the questions.

Q. Keeping these at a fairly general level, firstly, has Hydro prepared any implementation plans with respect to the scheduling of refurbishment and detailing of modifications to their stations? Is there an implementation plan for life extension?

MR. SHALABY: A. Yes.

Q. And has that been presented to this Board?

A. Yes.

Q. And what exhibit is that?

A. There are various exhibits associated with Panel 8 and interrogatory answers that indicate that Hydro plans to increase the expenditures in what we call OM&A, Operation Maintenance and Administration

expenses, at stations like Nanticoke, for example, in a life management program. And we provided exhibits that indicate the extent of rehabilitation work at Lakeview and Lambton.

Q. So those, what you are referring to as implementation plans are that which we have reviewed in Panel 8.

A. Yes. And the associated interrogatories and transcript undertakings.

Q. Have any studies been conducted on the expected reliability of the stations that are going to be refurbished?

A. My knowledge is that their aren't detailed studies to that effect. There are projections of reliability levels of the stations into their golden years, if you like.

Q. What I was trying to deal with conceptually is, as I understand it, Hydro has planned for a use of approximately 40 years for their stations, individual stations. When I was referring to implementation plans, I misspoke myself; I should have said detailed drawings or programs with respect to rehabilitation.

But what we are concerned about is the fact that there may be very many stations which have

been operated for a considerable period of time and that Hydro will go through a program of refurbishing and entering into an extended life for those facilities. And as I understand the evidence, you are projecting a 10- to 20-year life beyond the 40 years; is that correct?

A. Yes. We said we didn't project an exact number. But it is longer than 10 years. Your estimate of 10 or 20, it is in that range.

Q. And is it anticipated that you would take a refurbished facility and operate that on a life management system, which is as I understand it, a continually process of maintenance, for a 10- to 20-year period, is that correct?

A. Yes.

MR. SNELSON: A. The addition there is that the life management starts from today. It doesn't start from retirement date. So it is from now on.

Q. Mr. Snelson, I'm trying to think if you have two cars. I'm going to make this simple. I have a 1980 Oldsmobile which I have basically said has come to the end of its life and I haven't done any repairs on it for the past 10 years. I have just maintained it so it just operates. That's model A.

I also have a 1980 Oldsmobile which I

have said I am going to keep operating for another 10 years. And accordingly, I have put in a lot of money into that car to keep it going.

So I have a model one and a model two. As I understand it, you are now going to take model one and you are going to refurbish it, is that correct, and bring it up to what level? Are you going to bring it up to a level that it was at in year one of its life?

I'm not explaining myself very well, but are you going to take it back to the point --

MR. SHALABY: I can relate to 1980 Oldsmobiles. I had one of those once. The Lambton and Lakeview are the situation you are talking about, bringing a car that was run down for a while, if you like, and refurbishing and then life managing.

Nanticoke is of the model two variety where we are going to start life managing early in its life, and we expect and hope that we don't have to go through a major refurbishment. So I think you can't discuss all the fossil facilities in the same vein. They come in two varieties.

Q. But in both instances, you are going to put those two facilities, the two models, on a "life management" project, program.

[12:15 p.m.]

A. Yes.

Q. And again I don't want to get into details, sir, but what I have difficulty understanding is how you can take a Lambton, refurbish it and put it on life management and assume that it's going to be as reliable as Nanticoke over the 20-year period, unless there would be extraordinary costs associated with refurbishing and maintaining Lambton as distinct from Nanticoke.

That is what I have difficulty understanding.

A. There are considerable expenses associated with refurbishing and rehabilitation, sort of a billion dollar category of costs associated with the rehabilitation.

Q. Excuse me, how many?

A. In the order of magnitude of a billion dollars, 800 million I think it is for Lambton, to rehabilitate the units. So it is a considerable expense, and then continuous additional expense every year after that.

Q. Wouldn't you be tempted to go beyond --

THE CHAIRMAN: Just a moment. I think the reliability factor and the life extensions was

dealt with in Panel 8 and whatever the Panel 8 witnesses said there would be the evidence I think we ought to rely on about that particular subject. Not downgrading the evidence we are getting here of that nature. But it was a matter that was discussed.

MR. HUNTER: If I might, with your indulgence, just one last point on this.

Q. Won't there be a tremendous temptation to go beyond the 20 years with these facilities, talking about cost?

MR. SHALABY: A. 20-year life extensions?

Q. Yes.

A. Beyond the year 20?

Q. Yes.

A. You are now saying 60 plus, beyond the 60-year life?

Q. Yes.

A. I think at that time if there is potential to use the facilities beyond that, that would be explored, yes.

MR. HUNTER: The last section, Mr. Chairman, of our cross-examination is on planning and again, I'm presuming it's Mr. Snelson and Mr. Shalaby.

Q. If I could take you firstly to our

page 23, which is transcript 26543, or it starts at that page, and we have 23, 24 and I think that Mr. Snelson is the principal witness at that time.

Sir, what I would like to explore with you, and obviously the main concern we have is the whole issue of the estimation of risk and how you choose to manage that and how that is incorporated into your planning process.

And as I understand the cross-examination of Mr. Mark with yourself, and I draw your attention to the bottom:

> Now, you indicated that the risks have to do with the unavailability of the approvals for those options. What do those risks translate to in terms of your customers?

And then on the next page the specific issue is:

> Is there a risk of outage?

And you indicate:

> I don't believe there is any significant risk of outage.

And the set of questions I have put to you is as follows: You have defined the risk to Mr. Mark as being the unavailability of the options, or the

unavailability of the approvals and I have some difficulty with that and I wanted to try to explore this issue with you.

Why isn't the risk the unavailability of the electricity? I'm trying to understand and have a definition of risk here, first of all, as distinct from not having the approvals in your back pocket.

MR. SNELSON: A. Clearly in terms of the reliability, the risk that matters is whether or not the electricity is available at the time that the customers want it.

Q. So it's not the availability of the approvals that's the issue of risk; you would agree with me that the issue of risk, as you have said, is having the power available?

A. Power available when the customers want it, yes.

Q. And if I understand the general planning policy, that if there is not enough electricity, then you go to your bag of tricks, your response portfolio; is that correct?

A. We go to the response portfolio when we forecast where is a significant likelihood of not being able to supply our customers. So we don't wait until the problem is here, it's when we foresee the

problem.

Q. And does this arise because you principally are planning to the median; that is, the need to reach back to your "response portfolio"?

A. No, I don't believe so. The need to foresee a potential supply shortage in the future and take action upon it is there both in the previous approach to managing uncertainty and the current approach to managing uncertainty which we call planning around the median.

Q. But does your planning uncertainty increase because you are in fact planning to the median -- around the median?

A. We believe that there is some small element of additional risk.

Q. Could you identify what those risks are, what are the characteristics of that risk?

A. Well, at the top of page 26544, which is page--

Q. Page 24 of ours, yes.

A. --page 24 of your exhibit.

Q. Yes, sir.

A. Exhibit 705, I gave an example of the sort of risk that we are accepting, that is a risk that a combination of high load growth and high natural gas

prices might cause some of the things that are relied upon in the response portfolio to be more expensive than we had thought they would be.

Q. Are there other examples of risk which you could give us?

A. That is one of the principal ones because the characteristics of what we are doing is that by foregoing the request for major supply approvals, then we are giving up one of the options that is available to us in the equivalent of the response portfolio that existed before.

So we have given up one level of response, the response is to have approvals ready for the use of major supply facilities which would enable us to move to coal and uranium as our fuels and reduce the reliance on natural gas, because most of the shorter lead time responses do rely upon either oil or natural gas as the fuel.

And so on the one hand we are taking advantage in this process of the current opportunities for lower natural gas prices to reduce costs to avoid having to spend on future options, but we also are exposing ourselves somewhat to the risk of high natural gas prices in combination with higher load forecast, and that is principally, we believe, an economic risk

rather than a risk of failure of supply.

Q. Would you accept that there is a risk associated with the effectiveness of your reliance on the demand management programs?

A. Yes.

Q. And can you help us attempt to identify the nature of that risk? If I'm sitting here and, as I understand your plan you are relying in a dramatic way on demand management to forestall the decision or the request for major supply until the year 2008, how do I understand that risk so I can manage my affairs?

And I want to understand what the possibility is. I know the issue of probability is not on the table, but I'm asking you to use your judgment to help me understand the risks associated with demand management?

A. I don't believe the risk of demand management impinges directly on customers, it's an indirect effect and --

Q. You have to help me there, sir.

A. Yes. The reason it's an indirect effect is that what impinges on customers is: Is there enough electricity capacity in the province to be able to supply all of the demand that the customers have for

electricity.

And this demand and capacity balance is affected by all things that affect capacity and all things that affect demand. And so somewhat lesser achievements on demand management than we have forecast would tend to make that balance a little less favourable in terms of -- would reduce the chance that the capacity would exceed the demand or, putting it probably the right way around, it would create a small chance that the capacity might not be sufficient for demand.

But there are many other things that affect that balance. Our current expectation for the next 10 years or more is that we would have more than enough options and that there is quite a bit flexibility in case demand management does not succeed.

Q. Would you, as a planner, accept the following proposition: That the demand management projections or targets could fall short?

A. Clearly there could be underachievement of demand management targets, there may also be overachievement.

Q. I want to carry two themes here. The first is, if you have to use your response portfolio, that means that you have to produce additional power

for your customers in the province; is that correct?

A. If the risk that comes about is in the direction of increasing load or reducing capacity, then we have to do something to restore that balance and that can mean increasing the supply of electricity in the province or finding some other way to reduce the demand.

Q. Is it fair to say that the response portfolio is there to manage the risk but it doesn't necessarily, if you like, get rid of the risk?

A. Yes.

Q. And is it fair to say that in very substantial terms your planning process, which you have described here, really hinges on that response portfolio to be effective, in the event that you fail to meet the targets?

A. The response portfolio is important to the Update Plan?

Q. Is it fair to say that if you have problems with implementing your response portfolio or the provisions in that portfolio, that the planning process is inadequate?

A. Well, clearly the responses that are in the response portfolio are a variety of responses.

Q. Yes.

A. And so the likelihood is that if there is some difficulty implementing one response, then some other response that is in there will be satisfactory. It is a rather unlikely outcome that all of the responses prove to be ineffective.

Q. Okay, fair enough. Could you go to our page 27, sir, which is your figure 9-7.

And I want to discuss, sir, this diagram, in the context of the ability of the system to supply energy through the CTUs.

And my first question is: What are the circumstances that would require Hydro to bring on line a CTU?

A. It's when the forecast of demand, after allowing for all of the demand management options and whatever is the most likely range of that forecast at the time this is being done, exceeds the load meeting capability expected of the existing system, plus any additions to the existing system that are expected, and that would include non-utility generation, purchased non-utility generation as well.

Q. Now, in that context, if I go to page 16 - and I would like you to try to work with both pieces of information - page 21 of Exhibit 452 and in that I believe the evidence is that:

The reasonable starting point is that a period of about five years is required to recognize and react on a fundamentally new trend line in customer demand.

Now, am I correct in saying that it will take you four to five years to determine whether or not a CTU would be required, for example?

Well, let me put -- it would take you four to five years to determine whether or not demand management is not being effective?

A. No, I don't believe so.

Q. How long do you think it would take for you to make that determination?

A. Well, it's a determination that we are making each year as things -- as time goes by on the success of the programs to date and projecting that out into the future.

Q. Then am I wrong in assuming that you would not make changes in your predictions or programs on a basis of a four or five-year analysis and that you would make those changes at an earlier point in time?

A. We expect to review all sorts of all kinds of forecasts for capacity and loads and demand management usually on about a one year --

Q. I'm sorry, sir?

[12:35 p.m.]

A. Usually on about a one-year basis.

Q. Mr. Snelson, could you help me with the following difficulty. I can appreciate that Hydro would obviously, perhaps even on a daily basis, review what is happening, how do I correlate the response that you have given to me, which is that you will review things on a yearly basis, with my understanding of the proposition that it takes about four years to recognize and act on a fundamentally new trend line?

My concern being of course that you will wait four or five years to make the decision.

A. I think we have already said in cross-examination from one previous cross-examiner, and I can't recall which one, that the five-year period here is a simplifying assumption for the purpose of this particular analysis. It's not the way in which you necessarily do planning. But on the one hand you want to recognize that each annual adjustment isn't going to foresee all of the future requirements, any future change. Some changes that take place one year to the next that might in effect be a change in long-term trend, would initially perhaps be attributed to a short-term deviation.

So you tend to not fully recognize a significant trend in the future; immediately you tend to recognize it in a way in which evolves over time.

For the purpose of this analysis we assumed effectively that we made no change in response to the new trend for five years and then we suddenly knew everything and responded fully. Now neither of those statements is fully accurate. This is a simplifying assumption for the purpose of analysis.

Q. But it's a possibility, meaning that it could take you four to five years, let's assume a worst case scenario, to make a decision?

A. It is likely, if there is significant deviation taking place, that you will be making some decisions in the intervening period, because you are not talking about one decision, you are talking about many decisions that take place in planning, and you would be responding as you became convinced that the changes were of sufficient magnitude to require a response.

Q. But in the absence again, with this whole question of what is significant, I don't want to debate that with you, but is it fair to say that what may happen in one year is not significant but interesting and in the second year it's not significant

but interesting and in the third year it's not significant but interesting, but when you add up the whole package, that it in fact is significant.

I am trying to recall the numbers that Mr. Shalaby and I were discussing where I think it was at one point you had lost -- if the demand management didn't work up to 30 per cent, there could be a loss, if I recall, of one or two years where the load would increase.

What I am interested in knowing is again in the absence of having anything concrete or a concrete example, at what point in your mind would you say that a loss or a decrease in the demand management program, particularly fuel switching, would constitute a significant change?

Would your response be the same as I think it was Mr. Shalaby's response in terms - what was the loss - 300 megawatts? If there was a failure to meet a target of approximately 300 megawatts or 600 megawatts, would that constitute a significant change?

A. Clearly, we tend to respond to changes, as I mentioned, in hundreds of megawatts. We don't tend to respond in our load and capacity balances to changes that are measured in tens of megawatts, and thousands of megawatts are very large.

I think this is the kind of scale of things that you are talking about and I agree generally with Mr. Shalaby's comments.

Q. Thank you. Now, if we go to figure 9-7, sample response, and I go to the top left-hand corner, element, promote demand management. Then we go immediately to the right and it's targets not achieved. This is the scenario that I am working with, that notwithstanding all of your best efforts, you are 3 to 600 megawatts short. Response, build CTUs and other major supply.

Let's assume for this discussion that your option is to build CTUs and you make that decision. As I understand your chart, you then drop down to the bottom on the left-hand side and it says CTUs.

A. Yes.

Q. And then I go across, approvals are not obtained in time to meet demand.

A. Yes.

Q. Now, I am not going to prejudge what the panel is going to say, but let's assume you don't get approvals for CTUs because you haven't asked them.

Are we together?

A. Yes.

Q. And then your response is, more demand management. But the reason you have got a problem is because you don't have enough demand management. I know there are other responses, but let me focus on the logic of the exercise, because it seems to me you have answered the problem by the very way in which you have defined the problem.

A. I think the flaw in the particular response as you have indicated, and I have said this previously in evidence, is that (A) this is a sample response portfolio and not complete, and that in the event of not achieving our targets on demand management, our first response would be to cut out some of our surplus management that is in the managed surplus cases, and you will recall that without the surplus management, the surpluses around the year 2000 are of the order of a few thousand megawatts.

Q. That's assuming, sir, you have the surplus.

A. But the point here is that if the demand management targets, and this is the strength of our current position, is that with the demand management programs we are pushing forward the NUGs that we are pushing for, and so on, we believe we have the capability of having a substantial surplus, and it

is that surplus around the year 200, that potential surplus that is the primary protection against underachievement of the demand management.

Q. I think you have sidestepped my argument. I want to back, there are two separate issues here. First is the accuracy and the possibility that demand could exceed supply at that point in time, as distinct from your planning process.

I don't think, with respect, you have answered.

I think there is a tautology here. You have defined the problem by its very answer. Fair enough, you can say, "Don't worry about that, Mr. Hunter, because we are going to have a surplus because of these issues." I am raising the possibility that if your demand management doesn't work, then in fact you may not have the surplus and therefore what do you do in those circumstances?

A. My point is that the demand management has to fail by a large margin to not have the surplus.

Q. I'm a cynic.

A. Assuming I am prepared to deal with your hypothetical question--

Q. Yes, sir.

A. --and it seems to me that it depends upon what is the reason for which you need CTUs. For instance, CTUs are a response to a variety of things, and the more demand management is not the only response that is shown here as a response in the event that we do not have sufficient approvals for CTUs.

Q. Yes. You have got NUGs and you have got purchases.

A. Yes.

Q. And what would be the lead time for NUGs?

A. Of the same order as CTUs.

Q. And if NUGs aren't available, then you are left with purchases; is that correct?

A. In the examples that are quoted here, yes.

Q. And is that being dealt with in the plan? In other words, as I understand the plan, you have purchasing from Manitoba but there is no other purchasing that's being contemplated with respect to these approvals; is that correct?

A. We are not seeking approval for any long-term purchases. We are seeking approval for the transmission to incorporate the Manitoba Purchase.

The purchases that are being referred to

in this response portfolio are likely of a short-term nature over existing interconnections with interconnecting utilities, that can be arranged on anything from, under certain circumstances, a few hours ahead, to a few years ahead, anything in that spectrum.

Q. But as I understand the process, if you were to require approvals for your CTU or for NUG, or additional purchases, you would have to come back before this Board to obtain those approvals; is that correct?

A. I'm sorry, can you repeat that question? There were two parts to it.

Q. Assuming that demand management failed and that additional electricity was required, and that your options were NUGs, CTUs, or additional purchases, that you would have to come back before this Board to seek those approvals?

A. Not necessarily.

Q. Why wouldn't you?

A. I don't believe --

MR. B. CAMPBELL: Just a minute.

MR. HUNTER: Perhaps Mr. Campbell can help me.

MR. B. CAMPBELL: Mr. Chairman, we have taken the position that as a matter of law under the

Environmental Assessment Act, certainly which is what this application is proceeding under, there is no approval required for Ontario Hydro to enter into purchase arrangements for non-utility generation, no approval required under the Environmental Assessment Act. We have taken the same position with respect to purchases, and we have taken -- and I should advise my friend that there is an exemption order with respect to CTUs should there be a shortfall in capability to supply, and that's an existing order.

MR. HUNTER: I wasn't aware of that, Mr. Campbell. So there is an existing order to seek an exemption if CTUs are required? Did I understand you correctly?

MR. B. CAMPBELL: I am not going to try and paraphrase the order. There is an existing exemption order and it does relate to CTUs.

MR. HUNTER: Would you be prepared to provide that to me, sir?

MR. B. CAMPBELL: I think it has been provided on the record already. I would be happy to provide my friend with a copy.

MR. HUNTER: Q. Just so I can understand the process, Mr. Snelson, if we were to assume in 1992 or '93 that there was a change in the trend line, and I

would like to, particularly given Mr. Campbell's comments, understand this very, very clearly, and assume that it would take you four to five years to recognize that, this takes us into 1966/1967 -- sorry, 1996 or 1997, and that it was recognized that there had to be a response. As I understand Mr. Campbell, that there is an exception order that would allow Hydro to proceed without approval to build that facility.

I am asking Ontario Hydro for a response to that, because I am obviously saying I was not aware of the order in council with respect to the exemption. I want absolute clarity with respect to that issue in terms of the scenario that I have provided, because if that's the case, then clearly a substantial concern that we have is gone.

MR. B. CAMPBELL: I think if the focus is on the exception order, my friend should refer to it himself. It relates to specific circumstances and those are set out in the exemption order.

My recollection is it also has an expiry date. These things normally get renewed. I can't recall off-hand what the expiry date is, but I don't think it's as far out as my friend's hypothetical.

THE CHAIRMAN: In Exhibit 452 Hydro recognizes at least the possibility that approvals of

CTUs may not be obtained in time to meet need.

MR. B. CAMPBELL: Yes, and that relates to this question of whether one falls within the terms of the exemption order. And obviously one can never say with absolute certainty that these orders are renewed, although this type of one has, as I understand it, typically been renewed.

I think for my friend to satisfy himself, he is going to have to look at the exemption order. There is no other way to do it.

MR. HUNTER: Thank you, Mr. Campbell. I think on the basis of that response, and obviously I will have to look at that order, I would like to just pursue this issue.

Q. Mr. Snelson, just to review it, we were assuming in 1992/1993 that there is a change in the trend line. Assume that it takes you four to five years to react to that, which means that it is recognized in 1966 -- sorry, 1996 or 1997, and you need to react to that immediately, and that you require approvals, and I am assuming that it will take one to two years to get those approvals, it would take, as I understand it, approximately four years to build, so we are into a range of 2002 to roughly 2003 before additional supply is on line.

I want to marry that with the speculation that we had about 30 per cent failure in the demand management program, particularly fuel switching, of up to 50 per cent, which would push the date of the need for supply back. I think when we speculated on that, we were back into the range of 2004, possibly a little earlier than that.

MR. B. CAMPBELL: I'm sorry, I don't think that was the answer that was given.

MR. HUNTER: I think on the first scenario, Mr. Campbell, we went to 2006, and then on the second scenario we went back further than that, if I am correct. I think that we speculated on the two year period for each of the loss of 300 megawatts. And that, sir, is putting my back to the range 204 give or take.

Q. Our concern is the ability of the system to respond to that type of a scenario and to be able to ensure obviously adequate supply. I would just simply like your comments on that. And in that context just simply put very boldly to you, why you wouldn't want to have approval for a CTU available to you in the event that it was required in that range of 2004 to 2008?

MR. SNELSON: A. I'm sorry, does the

question boil down to, why wouldn't we want to have approvals now for combustion turbines that might be needed in the period 2002 to 2008?

[12:55 p.m.]

Q. I have pushed the bounds beyond that a bit. 2004, 2006, through to 2010, 2012. Why you wouldn't want to have those approvals available and ready to go in the event that the type of a scenario I'm laying out to you -- from a planning point of view, why not have that additional protection in the system given, in my judgment, and I'm putting this to you, the uncertainties associated with demand management. That's what it comes right down to.

A. Well, we have talked about our view of the uncertainties in demand management and their effects on the needs for our supply and the sorts of responses we would have in that case. And it is quite likely that the order of our responses is something like to not manage surplus, which is to allow the surplus to be less, to respond with increases in non-utility generation; and combustion turbines are likely to be about the third level of response to that type of scenario.

And you seem to indicate about a two-year approval time and a four-year construction time. That

is rather long for CTUs. If you go to Exhibit 452C, which is the updates to the figures in chapters 14 and 15 of Exhibit 3 of Demand/Supply Plan, on page 5 it indicates that the total lead time for combustion turbines is two to five years, and that includes definition phase and acquisition phase.

So I would say a little more likely estimate of the combined time of the definition phase and acquisition phase is somewhat less than you have indicated and is perhaps a little more in the order of four years.

Q. I was looking at five.

A. But that is quite a, those are approvals that we don't see that we need at this time. And there is some flexibility in having additional approvals. There is also some question that if you are seeking approvals, that you can show a very small likelihood of meeting, then it is difficult to make a reasonable case to do that because you have many other options that you wish to do ahead of that.

And there is also the risk that by the time you need the approvals, if you need them, that circumstances will have changed to the point where people will believe that the approval processes should be repeated, that the approvals will somehow or another

no longer be considered to be valid.

Q. I'm sorry. I don't appreciate that last point.

A. I think we have previously discussed the issue of shelf-life approvals.

Q. Yes.

A. And we can't say with some certainty that approvals are good for six years and in the seventh year they are no good. That's not a question that there is a clearly defined shelf life for approvals. But we have seen through this process and others that issues shift over time.

And so an approval that is obtained at one time, then the longer that the wait is before action is taken on that approval, then the greater the likelihood that there will have been changes in circumstances that cause that whole issue of approval to be reopened.

Q. But can their not be built into the approval process what I would refer to as benchmarks, and that is, that in the eventuality that if, for example, targets were not met, again I'm referring to demand management, and in those circumstances that the following actions could occur, namely, that approval for a CTU could be based conditionally upon the

inability of the system to respond to certain targets. And in the failure to respond to those targets, we know that there would be an earlier requirement for a supplier. At the end of the day, sir, that's simply what I am asking, and why couldn't Hydro consider that as an option?

A. Well, the demand management is probably not the most likely circumstance, the failure of demand management is not the most likely circumstance as we would foresee it that might require us to add CTUs. That is one circumstance.

It is more likely to be some combination of slightly lower performance in demand management perhaps, but in combination with increased load growth, it is higher than median load growth. And the load growth uncertainty is probably the biggest uncertainty that we face in the single uncertainty.

But coming back to why we wouldn't ask for approvals now, if you just go back to the type of thinking that went into Exhibit 3 and has been carried forward, is that we are in this process seeking approvals for major supply. We expect a need within five years of the end of this proceeding. And while that is an indefinite date, we have assumed that we would not seek approval at this point and time but we

wouldn't seek approvals for facilities where we expected to need to submit an environmental assessment in 1999 or beyond.

Q. You mentioned as one of your scenarios, sir, that it was unlikely that it could be as a result of a failure of demand management. But that if there was to be a concern, it would be because the load demand would increase and there would be a decrease in the expectations of demand management. Did I understand your answer correctly?

A. Not necessarily as one as a consequence of another.

Q. No, I appreciate that.

A. It is the combination of risks that might cause that to happen.

Q. And if I understand your response to the latter point, if I understand the approvals process, you are anticipating new supply requirements in 2009, is that correct; 2008, 2009?

MR. DALZIEL: A. 2009, the latter part of the year for median load forecast.

Q. And if we work back from that, as I understand the lead time to provide major supply, if the nuclear option is still on the table, is approximately 10 years, is that correct?

A. That is about a lead time for that option, yes.

Q. So, therefore, you would require your approvals in approximately 1999, if I work back from 2009. You would need your approvals in hand at that time.

A. You may start at that date. You wouldn't have all the approvals you need in hand at that date, but you could start on that date.

Q. So the approvals process theoretically, then, you are saying to me can go beyond 1999.

A. If you start in 1999, you could be successful in having the facility available for the year 2009.

Q. If I work back from that date, I'm assuming a two-year approval process which would mean the approvals would have to be sought in 1997.

A. No, I think I'm indicating you could start in 1999.

Q. What would start, the construction?

A. No.

Q. No?

A. You could start what we call the definition phase studies, which include the preparation

of environmental assessment documentation in order to seek the appropriate approvals.

Q. If you required new supply in 2009, let's start with that date, at what point in time would you have to appear before the environmental assessment Board to obtain your approvals? And I have misunderstood the information, because I thought to make it simple, we were looking at a 10-year lead time, and I was assuming that you required some time to go through the approvals process, meaning appearing before the Board to get those approvals. I assumed two years.

THE CHAIRMAN: I think we have gone through this quite a number of times already. The approvals process is built into the definition phase, is that not right?

MS. HOWES: Yes.

THE CHAIRMAN: Yes. We better stop for lunch, I guess. We will adjourn until 2:30 p.m.

THE REGISTRAR: Please come to order. This hearing will adjourn until 2:30.

---Luncheon recess at 1:05 p.m.

---On resuming at 2:35 p.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Be seated, please.

THE CHAIRMAN: Mr. Hunter.

MR. HUNTER: Thank you, sir. The lunch I think proved successful and we really hopefully only have another five or six questions.

THE CHAIRMAN: Thank you.

MR. HUNTER: We sorted out a lot.

Q. The next set of questions go to the issue of price, specifically to the evidence in the Update which is at page 31, Exhibit 452, page 31, specifically figure 9-8.

I have been provided with an interrogatory by Mr. Starkman which is Interrogatory 10.9.97. To the best of my knowledge that is the last piece of information with respect to real electricity prices.

And my first question is: The chart stops at 2011, and subject to being incorrect in terms of any additional information, can any member of the panel identify what the real price index will be or projected to be to the year 2017?

DR. LONG: A. I think, as I indicated in my direct, we haven't developed a price forecast out that far because that requires developing the associating system plan well beyond the year 2017.

Q. I'm sorry, you will have to help me there. I have asked for the price index from the year

2011, which I understand is the planning period before the Board, and I'm sorry, I don't understand your response.

A. Generally the planning period for the DSP has been to the year 2014.

Q. Yes.

A. And in the Update that, in many instances, has been extended to the year 2017.

Q. Yes, that is my understanding.

A. However, to develop the financial results associated with the plans, we really need the plans developed well beyond the year in which you want the financial results, and that is because cashflows in any given year are associated with facilities that are going to come into service several years down the road, and that is really why we have stopped in 2011.

Q. Okay. I'm going to have to take this in baby steps. Which plans haven't been developed beyond the year 2017 that would allow you to make this forecast--

A. I don't --

Q. --to the year 2017?

A. All of the plans have been developed to the year 2017, and what I'm saying is that only allows one to develop forecasts of financial results

out to the year 2011. Results beyond 2011 require definition of the plan beyond the year 2017.

Q. Well, my first question then is: To what year does the plan have to be finalized to show the real price index to the year 2017?

A. That really depends on the construction lead time for the options in the plan itself, and by and large I would say somewhere around five to seven-year time extensions will be required to be able to develop the prices out to 2017.

So you would need definition of the plan out to something like 2022 or 2025.

Q. So if I reduce this to a very simple proposition: We would have to know what the plan is in the year 2022 in order to know what we are going to have to pay in the year 2017?

A. Well, it's really a question of developing a comprehensive set of financial results, and certainly if you look at the other chart here, total borrowings, the borrowings in large part are dependent on our capital program, and our capital program in any given year is going to depend on what facility is going to be coming into service several years down the road.

If you were to take, say, the update

nuclear as an example, as I'm sure you are aware, the construction time for a nuclear station is several years. So if we have units coming into service around 2022 or 2025, they can certainly affect the financial results in and around the year 2017, and that's really why we have to back off.

Q. But if you were going to seek approvals for major supply that would come on line in the year 2009 - and as I have been corrected, your approval process would start approximately 10 years prior to that time, which is 1999 - why wouldn't you know at that time what your costs were going to be and, therefore, you would be able to provide information as to the price index because you would know at that time, presumably, what you are seeking to build and what the costs of that would be?

A. That's right. You know, and in the plans as we have them now we are looking at major supply coming in around 2009 and we have the prices out that far. I'm not sure I'm fully understanding the difficulty you are having with my answers on this.

Q. I guess the major point I'm having difficulty with is, you are indicating that you will not be able to let us know what the real price index would be in 2017 until the plan has been formalized

until the year approximately 2022, and I have in my mind a vision that what you have said is: We are going to have a whole new plan that we are going to have to bring on line in order for us to tell you what is going to happen in the year 2017.

And my difficulty, sir, is that I would have thought that at least by the year 1999, given what you have just said, that you would be able to tell us what the price index would be, given the fact that you would be proposing major supply at that time and you would know what the cost of that is. I guess that is what I'm having difficulty understanding.

A. Okay, maybe I'll try again. These results are the result of a comprehensive simulation of the financial results of the corporation. That includes more than just projections of electricity price, it looks at all the cashflows and costs, and to fully define that in any given year requires a definition of a system plan that extends out some years beyond the year in which you want to look.

So while you may argue that the electricity price forecast in any year is largely defined, it's not fully defined. We have, for instance, a net income component which is dependent on an interest coverage approach, which in turn is

dependent on our debt portfolio, which in turn is dependent on the capital programs.

So there are some inter-relationships there that, for us to, in a comprehensive manner, project financial results for any given year require a system plan to be developed a number of years beyond that.

MR. HUNTER: Could I have just have a moment.

---Discussion off the record.

MR. HUNTER: Q. Dr. Long, we have noticed that the line is proceeding upwards around the year 2011. Do you anticipate that that line would continue to move in that direction?

MR. LONG: A. I think anything I say on this will be a bit of a guess. The reason the line is moving up is because major new supply is being brought on line and, again, as I indicated in my direct that usually brings with it some significant impact on rates.

What's going happen to that line is really going to depend on the nature of the scenario, the units coming into service, and we do expect some further units to come into service beyond 2011, so one might expect it go up somewhat more but how much and

for how long is difficult to say. I certainly would not expect it to keep going up and up.

Q. Well, why don't I just break it down into a couple of hopefully simple questions. I notice the line going up from 1991 to approximately 1993 or 4, the same figure. Is that price index going up because of the costs in part of new supply?

A. Certainly Darlington is a factor in that.

Q. Darlington. And as I understood your evidence, sir, you indicated that you anticipate new supply in the year 2008, 2009, and we see the line beginning to move up at that time again?

A. That's correct.

Q. And you are premising that on new supply?

A. Yes.

Q. Is there any reason for me to think that the shape of that line, representing approximately a 20 or 30 per cent increase, would not be the same at that point in time as it is now?

In other words, you are anticipating major supply in 2008, 2009. You have already anticipated that the line is moving upward. Can I expect that the line, beginning approximately 2008,

will move upward for the same period of time and to the same extent as the line starting in 1991 which is I think approximately--

A. 10 per cent.

Q. --10. Well, I'm going from 1991 to 1995 which is approximately --

A. 20 per cent, sorry, yes.

Q. 20 points on the index. And, therefore, can I anticipate an increase of at least 20 points between 2008 and roughly 2015?

A. I don't think I could say that that would necessarily be the case. I think we would have to go through the simulations.

One factor that comes into play here when you bring in a capital intensive facility like an IGCC or a nuclear unit, you initially get this impact on rates but that initial unfavourable impact does turn around, so as you are adding a number of units what you are getting is it going up and then sliding down and you would really have to look at the compounding effect of each of these.

So I really have to do the simulation in question before we can really answer that question.

Q. One of the issues, Dr. Long, that I'm sort of trying to speculate on as we sit here is the

concern I have that we have a 25-year window for planning purposes for many factors going to the year 2017 which forms, in part, the basis for the five-year approvals which this Board is being asked for, but one of those factors; i.e. cost index -- i.e., the price index, is not going to be provided for approximately six years of that planning period.

And I'm not sure I have an answer to that, but it's something that suddenly causes me some concern, and perhaps you can suggest why I'm not concerned?

A. You used the word cost and price I guess in the same breath there.

Q. I misspoke price index --

A. And there is a big distinction. The cost of these plans, the cost effectiveness of these plans is assessed quite separately using the economic analysis which looks at the present value of the costs over the life of the options and over the life of the plans, and that is, again as I indicated in my direct testimony, is a primary financial consideration in defining these plans.

Q. I had misspoken myself by referring to cost, I was thinking of cost to my client not cost to you.

A. Well, ultimately...

Q. So my question still stands.

A. Ultimately the answer that you get from the cost question will show up in price, any difference being one of how that impact is distributed over time.

So if, for instance, you were to get a favorable cost answer but you were faced with a short-term unfavorable price impact, that would indicate that eventually the price impact would turn favourable. That's what I mean by the distribution over time.

Q. Let me go back to -- again, I won't rephrase the question just simply make the point - and perhaps you can help me with that point, is that this Board is being asked to provide approvals for a five-year period based upon a 25-year planning period which, as I understand it, goes to the year 2017 for which there is no evidence between the year 2011 and 2017 with respect to price index.

Is that a fair summation of the situation that we are in?

A. That's fair, yes.

Q. Would it not be fair then to suggest that you can't meet the criteria -- well, let me

rephrase that because you don't know what the price is going to be. I'll leave that.

In that context, to what degree does this price index -- is this based upon and incorporates all demand management targets and the load remaining at the median?

A. It's based on median load growth and it's based on the demand management program that's been discussed by this panel, yes.

Q. Is this price index tied to this proposed plan? Given what you have said, is it then reasonable to assume that in the event that your demand management program is not successful, then does it follow that the price index will increase?

A. No.

Q. And why not, sir?

A. Over this period if you were to analyze the impact of the demand management program it's had the effect of elevating the price over the whole of this period, and I guess depending on what you mean by not being successful, if that also means we are not going to spend the money on the program because we realize we are not going to get the benefits, then I guess that would be translated into a reduction in the program.

And if that were the case, depending somewhat on what would happen in response to that change, I would hazard a guess that the price forecast may come down somewhat.

Q. So if I understand the logic of that response, if the demand management program is not "successful", then the price index falls; is that correct?

A. Maybe I would prefer to state it. If we had a lesser demand management program, then the price index may fall, yes.

Q. But, as I understand it, a less demand management program would mean that possibly more supply would be required?

A. Yes. And I did indicate it would depend somewhat on what we did in response to that change, but over much of the period I would think the price would be a little lower.

Q. So if price is a concern, then one of the ironies is that the less effective the program arguably the better the price?

A. Well, again, as I indicated in my direct - and as I'm sure has been said many times at this hearing - the rationale for the demand management program is not to get a better price, from the

customer's perspective it's to reduce their bill, reduce their overall cost, reduce the revenue requirement of the Corporation and that effect will not be there.

Q. And so therefore, if one cannot reduce their demand through the demand management program, then one is faced with a higher increase in the prices without being able to take "benefit" of the program. Is that a fair assessment?

A. I think there's been a lot of testimony on this and I guess a key point to continue to reinforce is the demand management program is broad and diverse and it's judged that there are opportunities for all, if not most -- most, if not all, customers to share in both the costs and the benefits of the program.

MR. HUNTER: Thank you, Mr. Campbell, Mr. Chairman, panel members.

THE CHAIRMAN: Could we just record, I think it's Interrogatory 10.9.97, has that been recorded before?

THE REGISTRAR: 683.23, Mr. Chairman.

---EXHIBIT NO. 683.23: Interrogatory No. 10.9.97.

THE CHAIRMAN: Thank you, Mr. Hunter.

MR. HUNTER: Thank you, sir.

THE CHAIRMAN: Mr. Starkman, are you next?

[3:00 p.m.]

MR. STARKMAN: Thank you, Mr. Chairman. Mr. Argue, the Case Manager of the Coalition, is here with me.

We have given a number of documents to Mr. Lucas which we would like to have marked as an exhibit.

The first one that I am looking at is entitled: Background Materials for the Cross-Examination of Hydro witness Panel 10. We did manage to get this almost in its entirety to the witness panel more than a week ago, except for the last page which we didn't get to them until this morning.

THE REGISTRAR: No. 706, Mr. Chairman.

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 706: Background Materials for the Cross-Examination of Hydro Witness Panel 10, Coalition of Environmental Groups.

MR. STARKMAN: Mr. Chairman, I don't know if terms of the practice whether the panel had an interest in marking some of the materials in here as separate numbers or whether it was sufficient just to have it in as Exhibit 706.

Do you want me to run through and sort of

briefly indicate what it is?

THE CHAIRMAN: Most of them have sources and other documents that have already been issued and some are perhaps new.

MR. STARKMAN: Yes, that's correct.

THE CHAIRMAN: I think if we just have one exhibit, but if we come across one that perhaps should receive some special treatment then we will so mark it.

MR. STARKMAN: Now, there are three other pieces of paper which perhaps we could just mark. The first one would be entitled: The Effect of Fuel Substitution on Distributors' Net Revenue and Rate Levels.

THE CHAIRMAN: That is a separate one?

MR. STARKMAN: Yes.

THE REGISTRAR: That's 707.

---EXHIBIT NO. 707: Document entitled: The Effect of Fuel Substitution on Distributors' Net Revenue and Rate Levels.

MR. STARKMAN: The next document is part of Exhibit 4.7.4, which Mr. Lucas advises has already been marked as Exhibit No. 261.3. I don't know if we need to give it another number.

THE CHAIRMAN: Perhaps if it's got that number already we don't need to give it another number.

MR. STARKMAN: The last one is an excerpt from the debates in the House, Thursday, January 23rd, 1992. We will mark that as the next exhibit.

THE REGISTRAR: 708.

---EXHIBIT NO. 708: Official Report of Debates (Hansard) Thursday 23 January 1992.

MR. B. CAMPBELL: Mr. Starkman, I have two, which is the excerpt date? Is this September 19th, '88?

MR. STARKMAN: The one I am looking at is Thursday January 23rd, 1992.

MR. B. CAMPBELL: Thank you very much.

THE CHAIRMAN: Do we have this 4.7.4, which was Exhibit 261.3, do you have that?

MR. STARKMAN: I gave copies to Mr. Lucas.

THE REGISTRAR: Coming up.

THE CHAIRMAN: Is it a response to an interrogatory?

MR. STARKMAN: Yes, I believe it is. This is part of the response to Interrogatory 4.7.4, which is quite a lengthy response. And this is really, as it says at the top, part 2 of Volume 5 of a long interrogatory, which was, I believe, marked as 261.3.

THE CHAIRMAN: So perhaps to be

consistent, 4.7.4 should get a number in this panel as well, which will be No. 24, I guess.

THE REGISTRAR: Yes, .24.

---EXHIBIT NO. 683.24: Interrogatory No. 4.7.4.

MR. STARKMAN: Mr. Chairman, this fuel switching material there are quite a few pages, but I only have two brief questions that I wanted to address to this panel concerning fuel switching. It seems to have been a matter of some discussion already, but it has been extensively dealt with previously.

CROSS-EXAMINATION BY MR. STARKMAN:

Q. I guess, Mr. Shalaby, you seem to have been answering these questions. I am just wondering with respect to fuel switching, and I do recall your evidence this morning that Hydro had limited or no experience with a province-wide or program with respect to fuel switching, but I just wanted to know, are you aware of any studies or evidence which indicates to you at this time that Hydro will not be able to meet its fuel switching targets?

MR. SHALABY: A. No, I am not aware of any.

Q. And the second question is, with respect to the rate impact, has Hydro done any studies or are they aware of any studies done by others such as

the Municipal Electric Association, or others, as to what the long-term rate impact might be of fuel switching?

A. Your Exhibit 707 is the only thing that I can recall on this, and even then I wasn't aware of it. You brought it to our attention.

Q. Thank you.

There were some other matters that I wanted to touch which were raised by other parties who cross-examined so far.

A. Now, there might have been in the fuel switching, we talked about a screening program that determines the impact on rates and on participants and non-participants, a program called DS Strategist, if you recall. There may have been screenings of particular fuel substitution initiatives, and from that they could determine the impact on rates or on non-participating customers.

So those are studies on particular fuel substitution programs, if there are any. And even then I am not really sure they have done any detailed DS Strategist runs of that.

Q. Other than those two, you are not aware of anything else that's been done Hydro -- excuse me. Other than those that you have mentioned, you are

not aware of any other studies that have been done by Hydro or anyone else concerning that issue?

A. By Hydro at least, yes.

Q. Are you aware of any that have been done by anybody else?

A. Not to my own personal knowledge.

Q. Now, I wanted to move and talk briefly about a matter that was raised by Mr. Heintzman in Volume 154 at page 27273.

Mr. Snelson, I believe Mr. Heintzman was talking to you, or at least you were answering.

MR. SNELSON: A. Whereabouts was that you were referring to?

Q. Well, it really starts at about line 16 of page 27273. The part that begins:

"Well, if you turn to D1-6 and you look at the columns entitled New Nuclear Supply and New Fossil Supply.

ANSWER: Yes."

And so on, it continues down on the next page.

I am really focussing here on the bottom of page 27274:

"Well, maybe not, sir, but if you were satisfied as to the need to plan for

that, then that is the amount you would be planning for in terms of major new supply, 64.2 terawatthours?

ANSWER: That's if the high load forecast was to come about and you would have forecast for demand management non-utility generation...

QUESTION: Yes. And if you were satisfied that there was a rationale for the CANDU technology, then you would include that as a component of that new generation; wouldn't you."

A. Maybe we can proceed to your question. I have been reviewing this. I thought it was a rather confused discussion at the time.

Q. Yes. I think what I took from it, Mr. Heintzman was suggesting that if you were going to bring new fossil on line in the pre-2009 period, then you would certainly want to bring nuclear capacity on line, or consider bringing nuclear on line as well during that period.

A. I think I took part of his hypothetical question to be that there was a need for nuclear in that time period but I am trying to find where that is.

There were so many hypotheticals which were cast and recast in slightly different forms.

Q. Yes. And if you can take a look at the last page of our Exhibit No. 706, page 28.

A. Yes.

Q. What we have done there is that we have taken from Exhibit 646, page D1-4 and D1-6 and tried to calculate at the bottom the capacity factors of the fossil supply, which you indicated Hydro might be bringing on in the high load growth scenario. Are you following me, Mr. Snelson?

A. Yes, I am not sure of the relevance to Mr. Heintzman's cross-examination, but continue.

Q. Well, can you look then, can you take a look at page D1-4 and D1-6 of Exhibit 646.

A. Yes.

Q. D1-4 indicates the load and capacity table for the Update, upper load growth case, nuclear and fossil, and some time tables for bringing on that supply option?

A. That's correct.

Q. And D1-6 indicates the energy production or savings as a result of bringing that on?

A. Yes.

Q. If you look on page 28 of Exhibit

706, we have just reproduced or put together those two tables and tried to calculate -- we calculated the capacity factors that Hydro would be bringing on in that period. Have you had a chance to look at those calculations?

A. I believe Mr. Dalziel has been looking at those calculations.

Q. Mr. Dalziel?

MR. DALZIEL: A. Yes.

Q. Do they seem to indicate the type of capacity Hydro is projecting they might need?

A. Your line cumulative fossil looks to be the running total of all fossil installed.

Q. Yes.

A. The terawatthour column seems to correspond with our column that was in page D1-6 for all the energy associated with new fossil, and the capacity factor numbers seem to be the capacity factor of all the new fossil generation, and those numbers look to be about right.

Q. All right. Just to be clear, it's the capacity factor line we added. We purported to take the fossil and the energy numbers from the --

A. That's right. The capacity factor line is your calculation and it appears to be the

capacity factor of all of the new fossil options.

Q. And if you look at the capacity factors, you only get to numbers that are above 30, 32.2 or even up to 40 in the years basically after 2010?

A. That's what the numbers are indicating, yes.

Q. And if you can just turn to page B-7 of Exhibit 646.

Mr. Dalziel, so this page, if I am reading it correctly, if you look down, I am looking at the bottom, bottom part of the page, you indicate that if you use CANDU 4 by 670, it costs 29.7 cents a kilowatthour in 1991 dollars at 10 per cent capacity?

A. Yes, I see that.

Q. And it's not really until you get up to 80 per cent capacity factors that the nuclear numbers even approach your avoided cost.

A. Well, 80 per cent capacity factor it's showing 4 cents a kilowatthour, is the LUEC there.

Q. I guess the point is, you don't put on nuclear capacity to run it at 20 per cent capacity factor?

A. You wouldn't do that.

Q. Or even at 40?

A. Likely not.

Q. What about at 60?

A. You may begin to consider it.

Q. So if you don't need capacity, if you don't need at least 60 per cent capacity you wouldn't consider putting on a nuclear, assuming your analysis and numbers are all correct?

A. If you didn't need which?

Q. At least 60 per cent capacity factor?

A. Around 60 per cent is when you begin to consider it.

Q. Now, you projected in the year 2000, I believe Mr. Snelson, that Hydro was going to be experiencing a surplus.

MR. SNELSON: A. If we don't take actions to manage it, yes.

Q. If you turn to page -- I think it is at page 22 of Exhibit 682 which is the Panel 10 overheads. Is this an example of one of the places where Hydro indicates the nature of the surplus? Page 22 of Exhibit 682. Does this chart depict the projected surplus say in the year 2000?

[3:16 p.m.]

A. Yes, I believe the difference between the projected load capability line and the firm load

median line is the estimate of how big the surplus would be if we took no action to manage it.

Q. Now, this morning in talking about this, you said there was going to be several thousand megawatts. Is that what this chart shows in the year 2000?

A. We can find the precise numbers. But I believe it is of the order, it is in the order of 7000 megawatts, yes.

Q. I thought it was closer to 4 or 5.

MR. DALZIEL: A. It is closer to 5 than 4000.

MR. SNELSON: A. I said several, not seven.

Q. No, I understand that; several. So the several is closer to 5 than 4.

MR. DALZIEL: A. That is correct.

Q. And in that surplus, then, I take is at the peak.

A. It is relative to 20-minute January peak, yes.

Q. So if you had a dramatic increase in demand for electricity at the peak, you wouldn't, in any case, consider putting in nuclear capacity to satisfy that problem or to deal with that problem in

the short term. Mr. Snelson?

MR. SNELSON: A. If it was only at the time of the peak, that would not derive the need for a new capacities.

Q. But the surplus you are talking about or you have been referring to is with respect to the 20-minute peak.

A. Yes. But you have to, in planning considerations, you have to consider the situation over the whole year. So you can't just isolate the peak period and say that is all that matters. The whole year matters.

Q. I appreciate that. But you have been talking about it at the peak.

A. Yes.

Q. Mr. Snelson, just continuing here with some matters that arose during the cross-examination by other parties, I recall you talking to Mr. Mark about Hydro's preferences. He was asking you whether you preferred one plan over another. And you were very reluctant to answer that question. I don't mean to ask it in, I'm not asking it in a legal sense of whether you preferred it, if it should have a special significance. But in the common sense meaning, would it be fair to say that Hydro prefers the managed

plans over the unmanaged plans?

A. Yes, I have indicated that.

Q. And that they prefer the managed plans over Plan 15 or any of the other plans for that matter that are in Exhibit 3.

A. That is the whole intent of the Update, yes.

Q. And then is it reasonable to conclude that as between the managed plans, at this time Hydro has no preference. What they are indicating is there are a number of options, all of which seem acceptable at this time but we don't prefer one or the other.

A. We have certainly said that we have no preference between the managed nuclear and managed fossil plant.

Q. Now, Mr. Snelson, in the Update, Hydro talks about plans with approvals and without approvals; is that fair?

A. It is in the discussion of whether or not to seek approvals, yes.

Q. Yes. And you are seeking some approvals. So the no-approval option is when you don't seek any approvals then you have plans where you seek approvals.

A. Strictly speaking, a no-approval

option would be no approvals.

Q. Yes.

A. I would have to go back and review all our documents because I suspect that there are times when, loosely speaking, people may have written no approvals when they meant no major supply approvals.

Q. That is fine. My question really is, why in the Update hasn't Hydro talked about what I would call partial approvals, in other words, you get the hydraulic approval but no transmission from Manitoba; or vice versa, or you get partial hydraulic approval. Why was that type of scenario not examined or presented?

A. We have illustrated the effect of what we call the no-approval case, which is no Manitoba transmission approvals or hydraulic approvals in this process. And any approvals that might be required would have to be at later time and a later process. And that puts a bound on the effect of having no approvals. We have also talked about the Manitoba purchase separately.

Q. Yes. I recognize that. But what you haven't talked about separately is Niagara from the other hydraulic approvals. And isn't that arguably a severable matter, at least conceptually severable?

A. Well, as far as the approvals that we are seeking in this process are concerned, my understanding is they are not specific to any site.

Q. Yes. But I don't want to revisit that issue, except that they are not specific to any site although Niagara is a major part of the hydraulic approval package. You'd agree with me on that.

A. We believe it is likely that Niagara would be part of the hydraulic program that would follow, presuming that we get a hydraulic approval in this case.

Q. And how many megawatts is Niagara?

A. It has variously been estimated in the region of 600 megawatts or 900 megawatts, depending on the scheme that is developed.

Q. And you even mention that specifically, I believe, in the Update.

A. It is quite likely.

Q. I mean, I'm thinking here about a part which talks about prebuilding it or building it but not activating it until there was a greater need. Do you recall that discussion?

MR. DALZIEL: A. I think in Exhibit 646 under the managed surplus case as we have indicated that you might the build tunnels so that you could

utilize the water through an existing powerhouse but you wouldn't build a new powerhouse. But you might build that new powerhouse at a later date.

Q. Mr. Snelson, back to the question, can Hydro see any merit to talking from a planning point of view, about partial, what I'm referring to as partial approvals? You get the transmission but no hydraulic or you get the hydraulic but no transmission or you get part of the hydraulic. I mean, has it turned your mind as to what impact that type of decision would have on your plans?

MR. SNELSON: A. I don't think that we have separately run scenarios of those. We have provided some information about individual hydraulic projects in terms of their cost benefit ratios through the hydraulic plan and so on.

Q. So if I said to you, for example, that you got approval for Niagara but nothing else, you wouldn't really be able to tell me what impact that would have on your plans.

A. Not through having done a lot of analysis on that case.

Q. So Hydro has not done that type of analysis.

A. Not as a whole system simulation that

I know of.

Q. Now, Mr. Snelson, when you talk about no approvals, and maybe I'm coming back to the comment you made before, why does, for example, the no-approvals scenarios that are discussed have the same DSM targets in 2017 as the managed median load scenarios?

MR. DALZIEL: A. I think the managed cases also have, by 2017, all the demand management as forecast is in place. It is the same way in the no-approvals case.

Q. Yes, but what I am driving at is, why -- you say no approvals. And to you I guess that means no approvals from this Board for the hydraulic or the transmission. But then in every one of those cases, you project a major supply option or a major supply in 2009, 2010. Why haven't you projected an option which is just that, no approvals?

MR. SNELSON: A. I think in our view that is the maximum amount of demand management we could expect to get. But there is also the point that the strongest test of the economics of an alternative is to compare it to your next lowest cost alternative. If you deliberately say I will test the economics of this proposed plan against something else which I know

to be higher in cost and much higher in cost, then you are making your proposed alternative look rather good and artificially good.

And I think our view is that the case that we have put forward as the no-approvals case is about the lowest cost case, taking into account our preference is for demand management and non-utility generation on the assumption that we got no approvals from this Board and this process and that we didn't start seeking any approvals again for at least five years.

So we would then, if we were to look at a case which said no approvals now in the next five years and no approvals ever or no approvals for another five or 10 or 15 years beyond, then we believe that would have been higher cost no-approvals case that would make our case for our approvals look better.

Q. But a strong part of the reason or at least the threat I get from reading the materials is that you think your DSM projections are the maximum you can get and that is why you are not prepared to think there will be more DSM available even in the post-2009 period. You think that is somehow a ceiling on it looking at it from today.

A. It isn't a ceiling. But we do

believe that it is the highest amount that we can reasonably plan upon. It may be that in 5-years time or 10-years time, with very successful demand management programs behind us, we may see our way to raising those targets. It is also possible, as Dofasco was discussing this morning, that there may be some difficulties and we, in fact, may not achieve those tasks.

Q. Mr. Chairman, this might be a convenient time for the break.

THE CHAIRMAN: Break for 15 minutes.

THE REGISTRAR: Please come to order. This hearing will recess for 15 minutes.

---Recess at 3:28 p.m.

---On resuming at 3:53 p.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Be seated, please.

THE CHAIRMAN: Mr. Starkman?

MR. STARKMAN: Thank you, Mr. Chairman. Just continuing with some questions which arise out of matters raised by previous questioners of this panel.

Q. Mr. Shalaby, do you recall a conversation earlier in this panel concerning the question of cross-subsidies in demand management programs, that is, whether or not there is some

cross-subsidy between those who might take advantage of a program by those who don't take advantage of a program?

MR. SHALABY: A. I recalled such a conversation.

Q. Now, would I be correct that this time of problem, cross-subsidy problem would also occur in the case of major new supply in the sense that if a major new unit is brought on that is more expensive than running the existing system, then those who come onto the system or increase their load are being subsidized by the other users of the system.

A. You are hitting at the sort of ratemaking philosophies and what costs get allocated to what customers. Are they to all customers or only the ones that come new to the system. So there is a bit of difference in there in the sense that people don't have a choice when a new unit comes in, everybody shares the burden of the cost of a new unit; whereas in demand management people have a choice of participating or not participating.

Q. Right. When a major new supply is brought on, the cost is spread throughout the users of the system. I'm not talking here about rate design. Generally, it is spread throughout the users of the

system.

A. Yes.

Q. But that someone who is not increasing their demand or is decreasing their demand is, in the same sense that you were talking about it with respect to demand management programs, subsidizing the new user or the increased user through higher costs as a result of bringing on the major new supply.

A. Not in all conditions. If the new unit is coming in, for example, to replace a retiring unit, then there is no net increase in demand or supply or anything at all. We are just replacing an old unit with a new unit. There is a rate shock. So, there are some situations where a new unit is brought on not to increase a supply but to maintain it if there is retirement.

Q. Yes. But if a new unit is brought on to increase the supply because of increasing demand for electricity, then there is this subsidization problem.

A. Again, I don't know for sure whether it is the same, or not. I think there is philosophy that says in the natural gas business, for example, that the new user would pay for the new line and there are ratemaking philosophies that say all the users pay for the new line. And there are ratemaking

philosophies that say no, all the users pay for the new line, whether they are increasing their demand, or not. And there are strong cases for either philosophy in ratemaking. So to pin the cost of the new unit on the new demand is not universally accepted, in my view.

Q. I understand that. But heretofore that Hydro has not pursued the philosophy or that the new user pays for the new line, right? That is what you just told me. The costs of a new line or a new supply facility are spread throughout the existing users.

A. In Hydro's case, yes, it's spread amongst existing and new users, yes.

Q. Right. So while you may change philosophies to require new users to pay hookup fees or whatever fees to reflect the cost or to bear the cost of a new supply, that hasn't been the case with Hydro. So under the existing system, wouldn't you agree with me that existing users, to some extent, are subsidizing those new users or those who are increasing their demand for electricity and, therefore, requiring new supply?

A. I will go as far as accepting that existing users, even though they don't change their pattern of use, experience a rate hike when a new

supply facility comes in.

Q. All right. And they experience that. And, of course, I mean, Hydro is not out asking these people whether they want to opt in or outside. If they are a user, they are in.

A. Yes.

Q. Now, Ms. Howes, there were some questions that were asked by a previous cross-examiner about Hydro's corporate environmental policy. Do you remember those questions? They were found in the back of the Alternate Energy exhibit.

MS. HOWES: A. I think it is the Alternative Energy Review.

Q. Yes. Do you recall those questions?

A. Vaguely.

[3:48 p.m.]

Q. I can just read it out to you as to what it says. It says that:

> Ontario Hydro shall seek to manage all activities which affect the environment such that the Ontario community receives the greatest overall net benefit in the long term.

Do you want me to read it again?

A. No, I think I have it.

Q. Okay.

A. I'm waiting for the question.

Q. Okay. My question is this, it struck me that this environmental policy is an indication by Hydro that decisions are to be made based on social costs and impacts and not primarily on customer costs.

A. Could you define what you mean by social costs?

Q. Yes. I think what I'm trying to suggest here is that you have presented a lot of evidence about the costs and the benefits or otherwise of Hydro's programs, but all of these costs relate to Hydro users and that Hydro has really equated Hydro users and the cost to Hydro users with the social cost, and by social cost I mean the cost to everyone living in the province, whether or not they use Ontario Hydro's services and the extent to which they use them.

Do you understand the difference I'm making here, the distinction I'm making?

A. I think so. There are costs to our customers and you are suggesting there's a broader cost to the province as a whole or society as a whole, as social cost?

Q. Yes. And I'm suggesting that your environmental policy doesn't make reference to Hydro

users, it refers to the Ontario community, and I'm just trying to inquire: Isn't this a mandate or a direction that Hydro should consider the costs, the entire costs or manage their activities in such a way that the Ontario community affects the overall benefit.

And I'm suggesting you are not doing that, you are managing it so that the ratepayers of Ontario Hydro receive the greatest overall benefit.

MR. SNELSON: A. If that was intended to be a summary of my costing evidence, then that was not an accurate summary.

Q. Let me back up again. The policy says that you should:

> ...manage all activities that affect the environment such that the Ontario community receives the overall net benefit in the long term.

Isn't the Ontario community different than Ontario Hydro users or ratepayers?

MS. HOWES: A. Can you repeat that again, please?

Q. Isn't the Ontario community different than Ontario Hydro users or ratepayers?

A. Yes.

Q. All right. And isn't the thrust of

your evidence, or hasn't it been to date to maximize or to manage Hydro's activities which affect the environment so that Hydro ratepayers receive the greatest overall benefit, and you haven't really paid much attention to its impact upon the community?

A. I'm not sure I would agree with that.

Q. All right. Well, would you agree that if you have persons, corporations or organizations, that persons, corporations, organizations use different amounts of electricity and use them for different purposes?

A. Okay, sure.

Q. All right. And that, therefore, a plan which optimizes the impact on electricity users does so to differing degrees depending on whether they use electricity, the extent of the use, the purpose of the use?

A. The reason I'm hesitating is I'm thinking of our emissions. I don't think I would allocate emissions from our stations, for example, on a user basis; I couldn't say that a corporation because of their use has this many emissions.

I'm having trouble understanding I think the point of the question.

Q. Well, let me turn to you, Mr.

Snelson, maybe you can help me. I mean, a lot of the evidence that Hydro has given or a lot of discussion turns around avoided cost, whether something is within avoided cost, powered cost, all those concepts.

You agree with me that's one of the key factors Ontario Hydro uses in planning?

MR. SNELSON: A. Yes, but not the only factor.

Q. Yes, but it is one of the predominant factors?

A. It is an important factor.

Q. All right. And that to the extent that that's used, that is a consideration of maximizing or managing the activities of Ontario Hydro so that Ontario ratepayers or Ontario users receive the greatest overall net benefit?

A. If you remove the superlative, because it's only one factor. Cost to our customers is one factor, it's an important factor. And when we are measuring cost to our customers, then we described it in our total customer cost test and so on, and that's where rates start to become important and so on.

Q. So you want me to remove the greatest, you want me just to say receive the overall net benefit in the long term?

A. We try to achieve low cost to our customers, and cost in that sense has the definition that is contained to our customers and their costs as they experience them through being part of the electricity system.

Q. Yes. But just focussing on that criteria, then it really depends upon - let me put it another way. If you focus on the costs as you have described them, then large users get a greater benefit than small users. Just focussing on that one criteria.

A. Well, the rates may have different effects but that would be a tendency.

Q. Yes. I'm not trying to sidetrack us into a rate discussion or rate design.

A. No, I appreciate that.

Q. What I'm saying is, if you take residential users -- if someone, a residential user uses three times as much power as their neighbour then they get -- then it's skewed in their favour, if you like. Just thinking on this cost.

A. Well, if you actually think about the electricity user who uses three times as much as his neighbour, then he's paying three times as much.

Q. Yes.

A. And, therefore, he's experiencing --

if he's only getting the same electricity, the same benefits from the electricity system, he's paying three times he needs.

Q. Yes, I know. But to the extent that you have minimized the overall cost, then that person benefits, assuming they need the electricity.

A. If we are in the situation where we have succeeded in keeping electricity rates down by five per cent, say, then he receives the higher benefit in dollars from the controlling electricity rates.

Q. All right. You would say the same thing as you pass over perhaps two people who are using it for other purposes. A lot of this depends on what use you are putting it to as well, this question?

A. That may be.

Q. All right. Now, to the extent that you rely on the costing mechanism, this is not a consideration of what's in the overall benefit of the Ontario community, this is predominantly a question of what's in the overall benefit of Hydro users, the extent that they use it?

A. We bring the other factors into account in our decision-making as separate factors.

Q. All right. Those other factors are environmental impact?

A. Yes.

Q. All right. Dr. Tennyson, I wanted to talk briefly or revisit this question of the economic benefits that you testified to in-chief and also had a brief discussion with, I believe Mr. Shepherd, and perhaps others.

Do I understand it that in your evidence you considered the direct economic impacts but not the indirect or induced impacts?

DR. TENNYSON: A. For the comparison of the options, that's what I did.

Q. Yes.

A. Talked about direct construction and operations. Those are the kinds of numbers that I had available.

Q. That's what I understand. Now, is there some reason why you didn't provide any numbers or information or analysis in respect to the indirect or induced economic benefits?

A. I could perhaps give you a reason. I guess as I just started to -- as I said, that's the information that I had available.

Certainly the other types in the more macro-sense, I told you, was available in terms of the plans and that from economics division. So that's

available in decision-making.

From my point of view I think I tried to articulate why the kinds of economic benefits that -- the ones that I speak to are important for decision-making as well.

And I guess even more in answer to your question, the numbers that we have at this point per option, let's say, for example: What would one 880 nuclear station do, we have pretty good evidence on that, but in terms of, let's say, looking at a CANDU 6 or an IGCC, we don't have the same experience. So it would be really guessing what the kind of induced effects would be.

Q. Yes. Well, you don't have to turn this up, but in Volume 157 at page 27845 I believe you said:

> I understand that from a sort of general Ontario economics perspective, and that's a different kind of perspective. I know they have used quite high multipliers in our economics group for any induced and indirect employment with those programs.
>
> I think you are talking about DSM programs.

A. Yes, I was.

Q. Can you give us or provide us with the multipliers that they used for the DSM programs?

A. I can't off the top of my head today. I could--

Q. No.

A. --question them in terms -- I understand in my discussions with them it's quite complicated the numbers.

Now, I know, was it in terms of the earlier report which is an exhibit - I assume it would not be in there in terms of the Demand/Supply Plans, so in fact we would have to be looking at their sort of any latest work they have been doing.

MR. DALZIEL: A. There is an interrogatory response which may contain that information on the multipliers. It's in the Provincial Economy Impact Assessment Model and that I believe is 10.7.15.

Q. 10.7.15?

A. Yes, 10.7.15.

THE CHAIRMAN: Could we have a number for that, please.

THE REGISTRAR: That is .25.

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 683.25: Interrogatory No. 10.7.15.

MR. DALZIEL: My understanding is it would provide the information on the multipliers that are used.

MR. STARKMAN: Q. All right. That's multipliers for the DSM programs?

MR. DALZIEL: A. I believe it will include it for DSM programs as well as for the other components of the entire plan.

Q. Well, we will look at that this evening. Now, Ms. Tennyson, you said when you gave your evidence you tended to talk in terms of construction and operational levels.

Would I be correct in assuming that the larger the capital expenditure the larger the construction and operational employment levels you assumed. Is that generally how it worked?

DR. TENNYSON: A. When I get the numbers to base any sort of predictions on, I go to the people that have, you know, had the experience in design and construction with these, and in terms of very large generating facilities they do tend to have much larger construction work-forces.

Q. Yes. So am I right then that the larger the generating facility the more employment you

assumed?

A. If that's what the numbers told me, and I guess I could say they tend to do that, yes.

Q. All right. And was there some multiplier used with respect to those assumptions?

A. Not -- because as I say, I was working totally with the numbers of direct at peak that they could tell me in terms of the construction work-force, and then how many operations people those particular facilities would need.

If in fact, as I said the other day, if I were in a particular area I would have to work out the multipliers in terms of indirect and induced.

Q. I think I heard the answer. What I'm concerned about is, these numbers you received from someone else, you didn't derive these numbers, employment numbers, for example?

A. No, because those numbers are part of the project characteristics, and it's the people that work in design and construction who are the engineers on those projects that give the numbers to people like me.

Q. And I'm just trying to find out how you made the assumptions about the impact of construction and related jobs. I mean, do you assume

if there's more jobs it's a beneficial or it's not a beneficial impact?

A. I don't particularly make those assumptions either. When I do my work, the people will tell me, No. 1, if jobs are an important benefit from the project in a particular area.

Now, as I said, based on my experience that usually is considered by a majority of people, or a lot of the people that I have come in contact with, to be a major benefit of a project.

As I also said, those numbers are the basis for the predictions on the kind of community impacts you will have.

Q. Yes. And what assumption did you make about that?

A. The kinds that I have used both in the environmental analysis and in my direct evidence tends to indicate that if you have a larger in-migration of workers and their families you will tend to get more significant local community impacts, that then you will have to have appropriate impact management measures to address, and that's based on the literature and, once again, based on my experience.

Q. Now, Dr. Connell asked you a question at page 27859 of the transcript which said:

Dr. Tennyson, I take it when you are focussing on direct employment that given a firm plan for a project that you could forecast the employment quite accurately.

And you said yes.

A. Yes, that's correct.

Q. And does history bear that out, was Hydro able to forecast the employment at, for example, Darlington quite accurately?

A. I can't say for sure.

Q. All right. So in that sense --

A. I think so, but I know that, you know, in terms of I could answer that question better, you know, in terms if we have had monitoring programs, we also looked at -- I don't think we had trouble predicting the amount of construction work-force. I think probably in terms of finding out how much actually were from the local area and how much came in, that would be something that follow-up studies would have determined and that is part of what our impact management activities do.

Q. Can we look for a few minutes at -- do you have Exhibit 10.42.31? It's already been marked as -- excuse me, Interrogatory 10.42.31, which has been

, marked as Exhibit 683.22.

Dr. Tennyson, do you have that exhibit?

A. Yes, I do.

Q. I'm starting here on the first full page of script under 2.0, Methodology.

A. Yes.

Q. This paragraph says:

The impacts of Ontario Hydro's expenditures on GDP and employment are estimated using an in-house provincial input/output model based on the Statistics Canada's 1984 interprovincial input/output data.

Can you just enlighten me as to what that means?

A. I will try. I'm not an economist, I did not prepare this report, I do not work in that group, however, I have discussed it with them so I will give you the benefit of what I can, and then if you need more perhaps I can get it.

As I said the other day, they do use an input/output model, which it says there, and they do use, still use 1984 data. Apparently that's the latest available for all the kinds of indicators and apparently that's pretty consistent throughout the

industry right now.

Q. All right. That's your answer.

Now, over on the next page in the first full paragraph it says:

> The input/output model is capable of isolating three types of impacts that will occur in Ontario and the rest of Canada. They are the direct impact, indirect impact and induced impact.

A. That's correct

[4:15 p.m.]

Q. Now, you have given testimony about the direct but not the indirect or induced. Maybe I have asked this before, but if you can tell me again, why is it that you didn't present evidence on the indirect and induced? The model was capable of generating that sort of information. I don't understand why you didn't --

A. As I explained, that is not the type of analysis I do. I do socio-economic impact assessment. The basis of that in terms of the economics that I use to predict things and to discuss various options is based on direct. That is not to say that once we were doing a project-specific application one would not as well try to speak to any sort of

indirect and induced impacts. In terms of this kind of model, it's a provincial model, and it is capable of generating, based on a number of assumptions, those three areas.

Q. All right. But in terms of your work, you don't deal with that?

A. Not at, (A), the provincial level, and (B), as I said, I would speak to those in a project-specific application when we had very specific numbers.

And as you can appreciate, if I were to give you numbers now on the direct, they are very much estimates based on best available knowledge as are these predictions. In terms of the input that went into this input/output model, it is very much based on pretty gross estimates as well.

Q. So in the planning process, do I take it that in designing the plan, in the planning process, at that stage Hydro does not take into account indirect and induced impact of your activities?

A. I think as I have said already, yes, they do. But they have a group in Hydro called, right now, economics and load forecasting and they would give to the system planners that kind of gross provincial level data and would be able to, as they did earlier in

'89 and now in the '92 be able to look at the kinds of impacts at the provincial level on GDP and on these various employment levels.

As well, my group would be able to discuss the social and economic implications of the options and plans.

Q. But isn't indirect and induced impact one of the socio-economic implications of any plan?

A. Of a plan, yes, and that's what you are getting.

Q. You said it's not your area, you are not here to talk about the indirect and induced impacts, and if you are not, is there someone on the panel who is?

A. They can if they wish.

MR. SNELSON: A. There isn't anybody who can speak to it with a great deal of authority because none of us are economists.

Q. I appreciate that, Mr. Snelson. I haven't even gotten below the surface.

All I am saying is, you have a model which generates. As Dr. Tennyson says it was generated, the economics people fed it into the planning process. All I am trying to do is find out what was fed into the planning process and how it's

treated within the process in designing the plan?

DR. TENNYSON: A. If I can just speak to, if you look at this interrogatory that you are referring to, you can see of the level of analysis that is done at that. And so when they talk about provincial level employment, they are trying to capture a number that includes not just direct but also some estimation of indirect and induced. They also are looking at GDP. That's the kind of macro level they do.

So it is being spoken to, it is part of the planning process. But to have a breakdown of the numbers for each thing, no, I do not.

Q. So indirect impact and induced impact are important for planning purposes, you would agree with my on that?

A. Yes.

Q. I have heard what you have said about how imprecise they are, and so forth, but they are important at whatever level --

A. I think Hydro considers them to be. That's why they do the analysis.

Q. Let move on down this page. I am down at the last paragraph on the page:

Impacts of economic activity out of

Ontario, as well as activity originating outside of Ontario in flowing back into the province are also taken into account. For example, if a crane is used for construction or assembled in Ontario and certain parts are manufactured in Quebec, then the import of these parts represent a stimulus of economic activity to the west of Canada. Therefore, importing equipment may create economic activity in Ontario if, say, the manufactured parts in Quebec uses steel from Ontario.

So I take it in terms of the direct employment, economic activity outside of the Province of Ontario is one thing you considered and fed into the planning process?

A. If you mean "you" by Ontario Hydro, it says right here that these were considered.

If you are asking me, did I look at direct employment outside, I wouldn't call it direct, but no, I did not.

Q. You did not look at direct employment outside of the Province of Ontario when considering the various plans. That's what you are telling me?

A. The analysis, as I have said, that

our group does and that I do would be able to analyze the plans from the component of how much direct construction-related employment or operations employment would be provided by that particular option in Ontario.

Q. So when this says impacts of economic activity out of Ontario as well as activity, and so forth, is that a factor that's considered in the planning process?

A. Our economics group does, and I think that there has been information already presented that does look at things like Canadian content and out-of-province content. And certainly we are aware of where things are purchased and that in fact might generate additional employment. It says right here that is part of what they do.

Q. So that is a consideration of the planning process as far as you are concerned?

A. Yes.

Q. You don't do it, but it's a consideration?

A. Yes.

Q. Now, Ms. Howes, just on that point, before I move on. As I recall the evidence, Ontario Hydro doesn't consider the natural, the impact on the

natural environment of its activities out of the province at all in the planning process; am I correct in that?

MS. HOWES: A. No, you are not.

Q. They do consider the impact on the natural environment outside of the Province of Ontario?

A. Some of. As I mentioned in my direct evidence, I referred to Exhibit 4, the environmental analysis, and it indicated the data we considered. We looked at, for example, the area required for uranium tailings, coal mining, uranium mining.

Q. The land area?

A. Yes.

Q. Yes. Other than the land area?

A. I will just refresh my memory.

Yes, I think it is just restricted to land area.

Q. So then in terms of Ontario Hydro's planning, do I have it that other than land area used, Ontario Hydro does not consider the impacts on the natural environment of its activity outside the Province of Ontario?

A. Yes, that's true.

Q. All right.

Can we move on to the next page, Dr.

Tennyson. I think I am still -- if I have the wrong person, direct me to someone else. I am just following my way through this document because it makes...

This one is under borrowing.

THE CHAIRMAN: I think you go to Dr. Long for borrowing.

MR. STARKMAN: Q. Dr. Long, do you want to talk about borrowing.

DR. LONG: A. Which page is this, sorry?

Q. They are not really numbered. I am following along here in 683.22. I guess I am on the third page of script at the top.

A. Okay.

Q. Now, Dr. Tennyson I think was -- I thought she was saying that the size of the capital project, the size of the project creates a number of jobs and has an impact on GDP. And I am trying to get a handle on this question. And this one says under borrowing:

> Construction of generating stations requires a significant amount of borrowing over the construction period. Ontario Hydro's borrowing, which causes interest rates to rise, would discourage or crowd out other investments. This in

turn will reduce GDP and employment.

Do you agree with that?

A. Again, I am not an economist, but I didn't think that was the case. I didn't think that Hydro's borrowing, given the integration of world capital markets, crowded out other investments.

Q. Dr. Tennyson, if this is so, that Hydro's borrowing crowds out other investments, reduces GDP and employment, I am just wondering how that was factored into and your analysis concerning the jobs created by social impacts of Hydro's plans?

DR. TENNYSON: A. I can't answer that question. That is not the type of analysis we were talking about when you were saying would a larger facility that has more megawatts potentially have a larger work-force, I agreed with you.

I did not say that therefore that means that that particular process has a better effect on GDP and total provincial employment. We weren't discussing that. So therefore, the fact that a large project could also affect rates or borrowing, that's not my area.

MR. SNELSON: A. Maybe I can deal with it, I think, from the perspective of this document. And that is, as I understand this point in the

document, it is describing the methodology, we are still under section 2.0, methodology, and at the very top of the page it says:

> This input/output analysis is augmented by taking into account the economic impacts of Ontario Hydro's borrowing, electricity price and energy savings associated with demand management programs.

So he's describing his model. And built into the model is the capability of estimating if there is this crowding-out effect and the degree to which it effects GDP and the interest rates that would have to be paid by other investments. And so that is taken into account in the results this analysis. I think you will find later on that there was a discussion as to whether or not it's -- the effect is taken into account.

Q. I agree with that, Mr. Snelson. I am just saying that the model, the input/output analysis is the model that Hydro used. That's what Dr. Tennyson just told us. It's the model that they used to generate the data for this discussion.

A. Yes. And in estimating -- I don't believe that this effect would estimate the direct

employment that Dr. Tennyson has been discussing, but it may very well affect the indirect or the induced, because that is a wider effect on the economy.

DR. LONG: A. I think another point perhaps worth mentioning as Mr. Campbell indicated in introducing that document, it is a draft, and we have already uncovered some errors and maybe there are some others.

DR. CONNELL: Since there are no economists present, perhaps we can speak freely. [Laughter]

Doesn't it stand to reason that the more capital we have employed in the province, the better off we will be, subject to the consideration that the capital must be used wisely and that we are not collectively, excessively leveraged so that we put ourselves at the risk.

DR. LONG: Again, with the understanding that I am not an economist, yes, I would think that that makes some sense.

MR. SNELSON: Again speaking not as an economists, but I suspect it might also depend on how much we pay for the capital. If we haven't generated the capital ourselves, and we draw it from outside, if we paid more than we can effectively earn with it, then

maybe it's not such a good deal.

DR. CONNELL: Surely we wouldn't knowingly do that.

MR. SNELSON: We wouldn't knowingly do that.

THE CHAIRMAN: Until Interrogatory 10.42.31 surfaced, I wasn't aware that the economists, or I have note recollection of economists having any impact on the planning process. The only time we have heard from economists in this hearing is on load forecasting.

Am I right about that? What do economists do, if anything, in the planning process?

MR. SNELSON: I believe in the family of documentation that went with the Demand/Supply Plan, which was Exhibit 3, there was an evaluation of the provincial economy-wide impact of the plans. And that is not an uncommon adjunct part of our analysis to try to give a perspective of the effect of the plans on the overall GDP of the province and the employment in the province, and other such macro economic factors.

DR. LONG: It is, in fact, a formal requirement part of our financial evaluation procedure for major projects and certainly plans of magnitude to do such an evaluation.

[4:33 p.m.]

MR. STARKMAN: Well, I am just going to forge ahead. I understand you are saying that the economists do things. They input into the planning process. There is no economist on the panel, yet the things they are commenting on are of some import. Let me ask the questions and if no one has an answer, that's fine. Just let me know and I will move on.

MR. B. CAMPBELL: If you are going to move on, just on that particular point, Mr. Starkman, I am sure that on the matter of borrowing, if you would consult with Mr. Poch on that matter, if this is of import to you, there is quite a hearing record at the OEB on this question of crowding out theory.

I won't give what I would submit to be the result of that evidence. But there is a hearing record of that question if it is of more interest to you. And I am grateful that someone remembered that this was a draft.

MR. STARKMAN: Q. Mr. Snelson, can I just, I know you said that -- you made a comment about whether the model was capable of or did, in fact, talk about direct employment. If you can just look at the second page of the interrogatory under the heading Direct Employment. The paragraph above says, the model

is capable of isolating three types of impacts. And then it says, direct employment. And it says, Ontario Hydro's investment and expenditures have a direct impact on GDP and employment.

And it talks, it goes on to talk about direct employment is a number of people involved in constructing, operating, and fueling.

So, I mean, just on its face they seem to be describing a model which generates some numbers concerning direct employment. I don't have a question. It is more a comment on your comment that maybe you didn't do that.

MR. SNELSON: A. Sorry, I don't understand what you mean.

Q. Let me move along. On the same page under Borrowing, the next one is Changes in Electricity Price. It says, an increase in electricity price will have a negative impact on the economy. The higher electricity price means higher input costs which reduce economic activity.

I mean, Mr. Snelson, I'm just wondering how these identified matters which come from the economics division or department are incorporated into the planning process. I mean, that is the question I'm asking.

MR. SNELSON: A. Well, the answer is that they provide estimates about how all of these effects that they have discussed affect employment in the province, GDP in the province, and other such macroeconomic variables. And they become part of the considerations in adopting different plans.

Q. Can we go to the next one, Energy Savings Associated with Demand Management Programs. This says that:

> Under demand management programs, the estimated reduction of electricity demand in megawatthours is valued at the average electricity price. At the same time investment will be made to install the demand management programs. The net savings will be the difference between the value of the electricity saved and the cost of the demand management programs. The increase in net savings is treated as a gain in disposable income and consumer spending. This will have a positive impact on the economy.

A. Yes.

Q. And that is a factor that is factored into your plans.

A. Yes. And if, for instance, demand management programs in total have the effect of increasing Ontario Hydro's borrowings or increasing the electricity price, that has a negative impact on the economy to the extent that there are benefits to participating customers which then increase their disposable income. That is a positive effect on the economy. So you separate these things out and you can identify individual negative and positive effects. What is important in the end is the bottom line as to what does it all add up to.

Q. And I take it that is what follows on the following pages is a discussion in comparison on some of these points as between the various plans that you put forward in 452?

A. Yes, bearing in mind that this is a draft document and this, as far as we know, was not thoroughly checked and ready for use.

MS. PATTERSON: Mr. Snelson, I don't see that it says draft anywhere on this.

MR. SNELSON: Sorry?

MS. PATTERSON: I don't see that it says draft anywhere, either in the interrogatory response or on the document, itself.

MR. SNELSON: That is true. But my

understanding, based upon the discussions that surrounded this document after it had been issued is that, in fact, it was an unsigned draft of the document even though it was not marked so.

MR. STARKMAN: Q. Mr. Snelson, let me just ask you this. When you say this question was discussed, was this analysis prepared before or after Exhibit 452?

MR. SNELSON: A. This analysis was prepared after 452.

Q. So basically you prepared 452. It goes to the board of directors. The board of directors makes certain decisions and then the economists get involved and do the type of analysis that is being done here.

A. In this case, yes.

Q. So let me just ask for your comments, then, on a certain, what impact their comments might have on your plans in terms of a couple places here. If you go a few pages in to section 4.0, there is a paragraph called The All Supply Case versus The Managed Fossil Case. Do you see that?

A. I see, 4.0 differences, I see a heading called The All Supply Case.

Q. The bottom of the next page.

A. Oh, the bottom of the next case.

Q. Under the all supply case, demand management programs are substituted by supply options in non-utility generation. Consequently, the all supply case requires more capital expenditures as supply options are more capital intensive than demand management programs. Furthermore, more variable OM&A expenditures are inevitable.

However, the all supply case has lower fixed OM&A expenditures because of no demand management programs. With higher overall expenditures, the all supply case means more borrowing and larger increases in electricity price. On the other hand, the all supply case with no demand management programs has much less energy savings.

A. I'm sorry. I haven't heard a question.

Q. The question is, in your view what are the economists telling you about this comparison? What impact does this have on the planning framework?

A. To a large degree, I believe this is

intended to be a description of the cases, more of their inputs rather than their outputs.

Q. Let's go to the following page, then, which is Economic Impact Assessment. I'm at the bottom here. The all supply case versus the managed fossil case. Do you see that one?

The all supply case generates 306 million more GDP impact but 30,200 less person years of employment anually.

Do you see where I am?

This is due to the fact that for every million dollars, capital expenditures have higher GDP impacts but lower employment impacts than energy savings.

Do you see that sentence?

A. Yes.

Q. Now, maybe this question is for Dr. Tennyson. I thought you told me that higher capital expenditures generated higher employment. That was the type of analysis you did?

DR. TENNYSON: A. Once again, I think what you asked me was if there was a larger project with large capital expenditures. And I said, in general, from what I have experienced, the numbers that I have been given for construction employment for

larger generating facilities tend to be the largest, yes, for direct.

Q. And you --

A. No, what you've got to understand in terms of if you are trying to get -- okay, I will let you continue first.

Q. Well, you said that. You said you got those numbers form the economic sector.

A. No, no, no, I did not. They got their numbers the same place I did, and it is from design and construction. In fact, they are using the same kind of, if they are starting with a number of the base construction workers for, say, a CANDU facility, they get it the same place that I do, so they start from the same place and then they make their various other assumptions.

Q. Let me just put the question this way. This last sentence seems to suggest that for every million dollars spent you get higher GDP but lower employment. Now, if that was true, would that have any impact on your analysis?

A. Those employment impacts would be on a provincial basis and would include the three components. I think in a way you are trying to compare apples and oranges. I think if you asked them the same

question, we both start with the same number of direct employment.

Q. All right. Excuse me. You have the same numbers as direct employment but it is the indirect and induced employment which might make a considerable difference.

A. I would suggest that is the case.

Q. So that is just an indication of the importance of those two categories to the whole planning process.

A. I would argue that they are important, yes, to the planning process.

Q. If you just turn to the next page, maybe Dr. Long, these questions are for you. I guess this page, table 1, is comparing the difference between three plans. And I take it you didn't have this information when you developed the plans that you put forward or the discussion that is in 452.

DR. LONG: A. This work was done after 452, yes.

Q. And does this, what does this tell us about, like, for example, an all supply plan? I take that it tells us that it has the highest rate impact according to the economics division? Is that how you read it?

A. Well, what the line relating to price says is that the average percentage increase in electricity price, all supply versus managed fossil, is .03 per cent higher per year presumably. And that is really just reflective of the fact that if you go over to figure 4, which is a few pages on -- this doesn't show it as well as I had hoped. But it really just follows from that pattern of electricity price changes. And because it is an average over the whole period, it is going to be much more reflective of the end points, the starting point and the end point. It won't say anything about what happens in between.

Q. Dr. Tennyson, I won't ask anymore about this unless you have something else you wanted to add. I did want to ask a bit about --

MR. DALZIEL: A. Excuse me. I might just add a comment on this, and that is that in Exhibit 3, in chapter 15 we presented the results of the GDP and employment impacts. Using the same model that is used interrogatory that you are now referring to, somebody in your group must have seen that information because there is the interrogatory that asks for the details behind that analysis which is the interrogatory that I referred to which is 10.7.15.

I won't profess to know the details that

are in that interrogatory, but they are showing details on the expenditures, the employment impacts in Ontario, the rest of Canada, the rate effects that you mentioned, the conservation effects, the demand management effects on employment; a lot of that information appears to be contained in the response to that interrogatory.

And we know in general from looking at the previous set of cases in Exhibit 3, we saw general trends with respect to the GDP and the employment impacts. The demand management, the NUGs, the hydraulic components were, and still are, all common to the cases that we generally look at.

[4:47 p.m.]

So the differences in GDP and employment impacts arise out of the differences in the major supply component.

And then typically, as has already been discussed, when you have a nuclear option you tend to have a higher Ontario content, there's a higher GDP impact and higher, you know, employment impact for Ontario.

And then as that balance changes towards a higher fossil content as opposed to nuclear, then we see the GDP impacts tipping the other way relative to

the case with nuclear.

So in the situation of the update, we have plans with a common -- generally they have a common hydraulic, NUG, demand management component and, again, in the long run the differences are in the major supply component.

And we generally understand, in that our information on the inputs that Dr. Tennyson has talked about that come from design and construction have not substantially changed since we did this analysis earlier for 1989.

So we have a pretty good understanding as to which way the GDP impacts and the employment impacts may go in the long run. And that is one reason - I think I said this earlier - as to why we didn't feel we needed to have these particular results run, done and available at the time that the update was being presented to our Board of Directors.

Q. Yes, Mr. Dalziel, but what you have just told us, I take it, relates predominantly to the direct employment impact?

A. Well, the model clearly is including direct employment, indirect employment and induced employment and it's taking that into account.

So when we are talking about Ontario GDP

impacts and employment impacts, the total effect is the total direct employment impacts, indirect employment impacts and induced employment impacts, and that's captured in the bottom line of the model or the bottom line of the output.

Q. Mr. Dalziel, can you turn to - I thought I was finished - but since you are willing to talk about this, can you turn to table 20 of that Interrogatory 10.42.31.

A. Yes, I have it.

Q. Now, as I understand it, if you are reading this chart, I'm looking here at the all supply minus managed fossil column.

A. I see that.

Q. And you go down to energy savings.

A. Right, yes.

Q. Okay. And it's a minus 13586; is that right?

A. Yes, I see that.

Q. Right. And this is a chart measuring differences in employment impacts between the cases?

A. That's correct.

Q. All right. So isn't that number 13586 an indication of the size of demand management direct, indirect or induced employment that one might

expect?

A. Likely. I don't know the details of that case, but that's likely what it's showing.

Q. And, I mean, the reason I'm asking these questions is because, as you know, we are concerned about demand management programs.

And it seems to us that Hydro has presented for discussion or analysis very little information on the effect of demand management programs on the Ontario economy in terms of employment, in terms of induced economic impact and so forth, so it's very hard to compare them on that point as between, say, an all DSM plan and an all major supply plan to see what the estimates of the impacts are.

The information just isn't here, although it seems to have been one of the factors which gets fed in somewhere somehow to the planning process. And that's what I'm concerned about.

A. That information was available in earlier interrogatories that were -- I don't have those numbers with me right now.

DR. LONG: A. I can give you a reference for the impact of the demand management program as it was included in the original DSP, and that is transcript undertaking 267.9, and that is a comparable

document to this but with just two cases, an all supply case and Case 15 and that was prepared, I guess, earlier this year.

Q. Dr. Tennyson, I wanted to move on and talk about public consultation, make it easier, and I understand that public consultation or public acceptability is one of the things that Ontario Hydro is concerned about?

DR. TENNYSON: A. Yes.

Q. Yes. And it's one of the inputs into the planning process?

A. Yes.

Q. All right. Now, can we look at, I think it's in Exhibit 535, Appendix 4. All right. I'm looking at table 4-2, Demand/Supply Plan Information Centre Questionnaire Response.

QUESTION: Now that you have rated the importance of each consideration for comparing plans/selecting a proposed plan, please rank them in terms of the priority you would place on each.

Now, the thing I noted from reviewing this table is that people seem to place minimizing overall cost fairly low on their list, on their rankings?

A. Yes, I would agree with that.

Q. And that a lot of other items were much higher like -- including a mix of demand management, new supply and reducing acid gas emissions were much higher?

A. Yes.

Q. All right. Now, what I don't understand is when you get this sort of a response from people, what does Hydro do with it. I mean, how does it input into the planning process?

A. Well, I think as I have suggested in previous discussions, that all of this information is fed back to the various groups within Hydro. As we were going through this process there were monthly reports sent to senior managers throughout the corporation.

In terms of the results of this whole program, they once again were distributed, presentations were made to senior management. It's all in line with the way we have described our planning process, and this is one of the components that is factored in.

Q. Well, let me give you some extreme examples. Let's say that 80 per cent of the people said that they did not want major new supply, would

that cause Ontario Hydro to take major new supply off the agenda permanently?

A. Not necessarily. You would have to look -- in any program of consultation or research or whatever, you have to look at the numbers of people, the representativeness of it, what the purpose of the program was.

As I said, this is feedback that comes back that doesn't form Hydro's decision-making. Clearly it gives the kinds of responses we got, gives some indication of the importance of our programs, our various options.

Q. All right. Can you look at the next Table 4-3. The question was:

> You may have additional comments relating to strengths, risks or issues about Hydro's proposed plan.

Are you with me there on page 69?

A. Yes.

Q. Okay. The way I read this table it says that 16 per cent are generally in favour of nuclear power. That's the response, the first one?

A. Of the number -- yes, that was the response.

Q. 16 per cent.

A. Yes.

Q. 6 per cent are generally against it, generally against nuclear power?

A. Where do we find that, up or down do I have to go?

Q. About in the middle. After:

More are indeed needed for conservation, energy efficiency, et cetera.

A. Oh, okay.

Q. All right?

A. Okay.

Q. 13 per cent are concerned about nuclear storage, about nuclear waste storage and disposal. That's about four down.

A. Okay.

Q. 7 per cent are concerned about nuclear accidents.

A. Yes.

Q. All right. So if you add those, you have 6, 13 and 7, so 26 per cent have a specific concern about the operation of nuclear facilities?

A. I don't think you can add them.

Q. No?

A. No, because it could have been one

person generally concerned about nuclear and listing the various other comments.

I think if you review my direct evidence the points were made that there are still concerns about the nuclear option and those have been consistent throughout the consultation in the 80s.

I'm not trying to minimize it by my response, I'm just saying that I couldn't say that you could add them.

MR. STARKMAN: Mr. Chairman, I was going to move on to another matter and this might be a convenient time to break.

THE CHAIRMAN: All right. We will adjourn until tomorrow morning at ten o'clock.

THE REGISTRAR: Please come to order. This hearing will adjourn until ten o'clock tomorrow morning.

---Whereupon the hearing adjourned at 5:00 p.m., to be reconvened on Tuesday, June 9th, 1992 commencing at 10:00 a.m.